Appendix H
Erosion and Sedimentation Control Plan

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1.0 Introduction

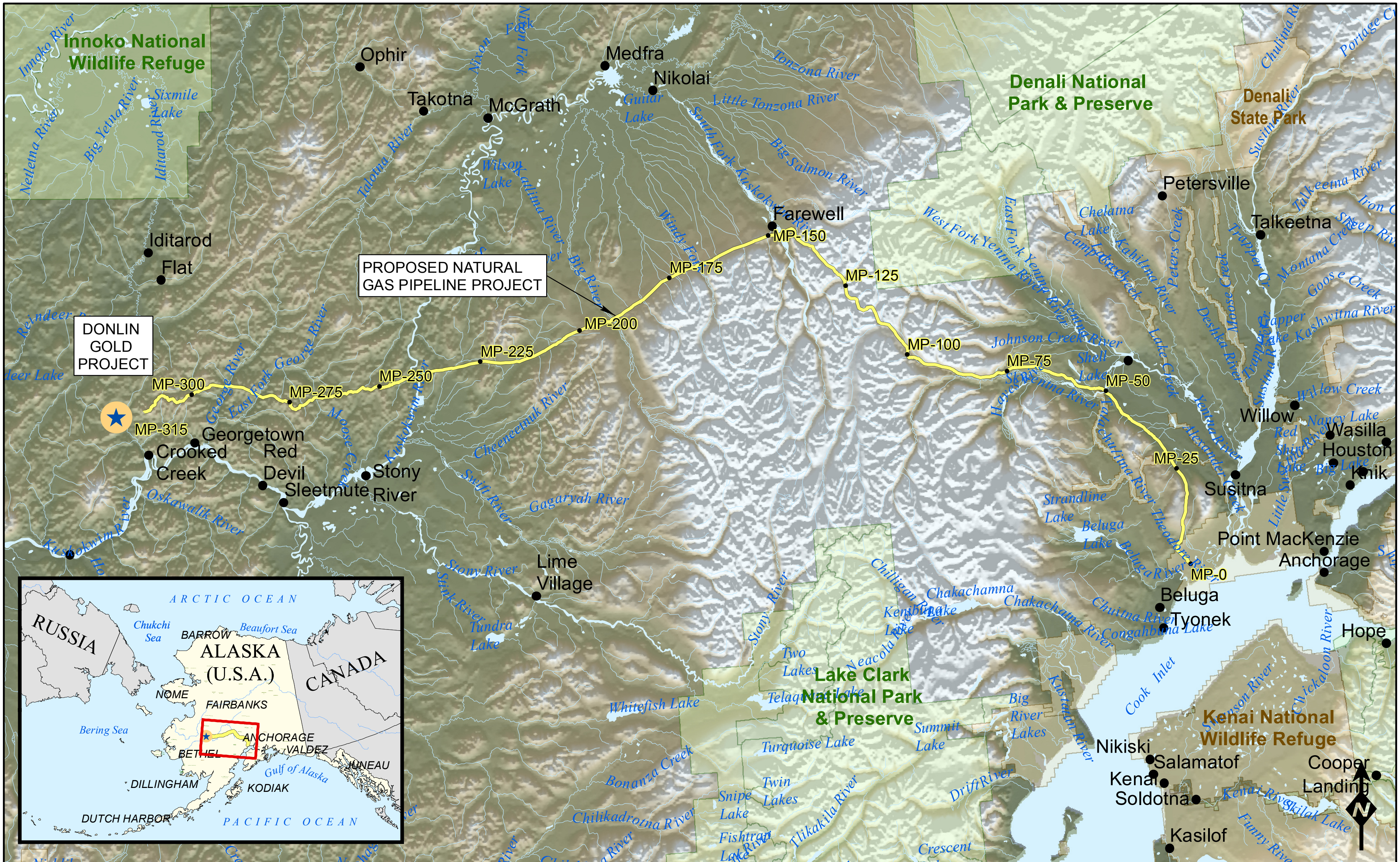
Donlin Gold LLC (Donlin Gold) proposes to construct a natural gas pipeline to support its proposed Donlin Gold mine project. The pipeline would use a 14-inch (356 mm) nominal pipe size to transport natural gas approximately 315 miles (507 km) from the ENSTAR Natural Gas Company's 20-inch (508 mm) Beluga gas pipeline near Beluga, Alaska, the pipeline's point of origin, to the mine site near Crooked Creek, its point of termination. Figure 1-1 shows a location map for the proposed Donlin Gold natural gas pipeline project, also referred to as the proposed pipeline project or pipeline.

Donlin Gold has prepared this Erosion and Sedimentation Control (ESC) Plan to minimize erosion and sedimentation related to construction, operation, maintenance, and termination of the gas pipeline project, and to the transport of sediment off the right of way (ROW) and temporary ancillary use areas and into streams, wetlands, and other sensitive areas.

Title 40 Code of Federal Regulations (CFR) Part 122.26 (a)(2) exempts the National Pollution Discharge Elimination System (NPDES) permit requirements for storm water discharges of sediment from construction activities associated with transmission facilities, unless the facility has a storm water discharge of a reportable quantity of oil or hazardous substances. However, the use of best management practices (BMPs) is encouraged, to protect surface waters during storms and to ensure that no discharge of reportable quantities or violation of the water quality standard occurs.

This pipeline project-wide ESC plan was modeled after the Alaska Pollution Discharge Elimination System (APDES) permitted under the Alaska Construction General Permit (ACGP) by the Alaska Department of Environmental Conservation (ADEC). This plan addresses erosion and sediment control only as they apply to the natural gas pipeline portion of the proposed Donlin Gold mine project.

This ESC plan is preliminary, based on the current level of pipeline construction and engineering design. This plan will be revised in the future as needed to meet construction and engineering design changes and the regulatory requirements of the ACGP.



- Milepost
- General Project Location
- Proposed Natural Gas Pipeline Alignment
- Federal Administrative Boundaries
- State Administrative Boundaries

SCALE:

0 10 20 40 mi

0 15 30 60 km

Seward Meridian, UTM Zone 5, NAD83

DONLIN GOLD

LOCATION of PROPOSED NATURAL GAS PIPELINE PROJECT

DONLIN GOLD PROJECT

FIGURE:

1-1

DG: PER0342.mxd, 10/29/13, R08

1.1 Purpose and Goal

The purpose of this plan is to provide detailed information on soil erosion and sedimentation controls used during construction, operation, maintenance, and termination of the pipeline. Specific areas covered in this plan include:

- Prevention and control of soil erosion;
- Best management practices (BMPs);
- Guidelines for design and installation of ESCs;
- Inspection and evaluation of ESCs; and
- Reporting procedures.

The goal of the ESC Plan is to prevent and control erosion and sedimentation that has the potential to impact water quality and the environment.

1.2 Responsibilities

Donlin Gold, their contractors, and subcontractors are responsible for the effects of erosion and sedimentation related to disturbance of the soil. Donlin Gold recognizes its role in preventing and controlling erosion and sedimentation, and in protecting the environment from related effects that might cause harm to water quality and to the surrounding environment. The proposed pipeline project will adopt BMPs to prevent, control, and mitigate erosion and sedimentation, and will implement a comprehensive monitoring and surveillance program to ensure continued stabilization and rehabilitation of disturbed areas.

2.0 Project Overview

2.1 Project Description

The purpose of the proposed Donlin Gold natural gas pipeline project is to provide a long-term, stable supply of natural gas to meet the energy needs of the proposed Donlin Gold mine project. The privately owned pipeline would be approximately 315 miles (507 km) long. It would originate at the west end of the Beluga gas field, approximately 30 miles (48 km) northwest of Anchorage, Alaska, at a tie-in near Beluga located in the Matanuska-Susitna Borough, and would run to the proposed Donlin Gold mine in southwest Alaska. The use of natural gas supplied via the proposed pipeline project has been evaluated and determined to be the most feasible, cost effective, and environmentally acceptable means of providing a reliable long-term energy source for the proposed Donlin Gold mine project.

The 14-inch (356 mm) natural gas pipeline would be designed to transport approximately 73 million standard cubic feet per day of natural gas and would require one compressor station located at approximately milepost (MP) 0.4. The pipeline would be buried with the exception of Castle Mountain Fault and Denali Fault—each approximately 1400 feet (427 m) long, which extend across active faults. Electrical power to the compressor station would be provided by a 25-kilovolt (kV) cross-country power transmission line originating at the 385-megawatt Chugach Electric Association power plant at Beluga. A fiber optic cable would extend along the pipeline route to the mine site and would be authorized separately.

2.2 Project Schedule

Donlin Gold estimates a two- to three-year pipe installation schedule within a three to four-year overall project schedule for construction, which would include infrastructure buildout, pipe installation, ROW stabilization, and rehabilitation and reclamation work concurrent with and immediately following pipe installation. The timing of all this would depend on receipt of permits and authorization to proceed with the construction of the pipeline.

The construction of the pipeline would be done using two construction spreads. Spread 1 would include the portion of the pipeline route from the Donlin Gold mine site terminus at approximately MP 315 to the Tatina River at approximately MP 127. Spread 2 would include that portion of the route from the beginning of the pipeline route near Beluga in the Susitna Flats State Game Refuge at MP 0 to the Tatina River at approximately MP 127. For construction purposes, each of the two spreads is divided into sections as depicted in Table 2-1. Each section is scheduled for summer or winter construction, depending on geotechnical and terrain-related issues.

Each pipeline spread would be awarded to a single pipeline contractor that would work over a period of two to three years to install the pipeline:

- Spread 1 (MP 315 to MP 126.6) would be further broken into four sections that would vary in length from 17.8 to 67.6 miles (28.65 to 108.79 km); and
- Spread 2 (MP 0 to MP 126.6) would be further broken into four sections that would vary in length from 9.8 to 51.0 miles (15.77 to 82.08 km).

Construction of access roads and gravel work pads, and production of bedding and padding material, would be done primarily during the season before the pipeline construction season, whether winter or summer. Pressure testing and final reclamation of winter sections would always take place during the spring shoulder season and/or the summer after pipe lay. However, stabilization, rehabilitation, and reclamation would progress as quickly as feasible and prudent, as construction continues. The construction season for any particular section is based on terrain, geotechnical conditions, most efficient ROW construction method, season length, accessibility, and other factors.

Table 2-1: Spread Execution Sequence

Section	From Milepost	To Milepost	Length (Miles)	Season	Start ROW** Work	Start Pipe Lay	Complete Pipe Lay	End-of-Season
					Spread 1			
6	315.2	247.6	67.60	S0.5	July, Donlin Mine	August	October	November, Alpine Ridge
5	247.6	196.6	51.00	W1	November, Alpine Ridge	January	March	April, Big River
3C	144.4	126.6	17.80	S1.5	May, South Fork Kuskokwim River	July	August	September, Tatina River
4	144.4	196.6	52.20	W2	November, South Fork Kuskokwim River	January	March	April, Big River
Subtotal Spread 1			**188.6**					
					Spread 2			
1	0.0	50.5	50.80	W1	November, Beluga	January	March	April, Skwentna River
3A	101.8	111.6	9.80	W1	March, Puntilla Lake	March	April	April, Three Mile Creek
3B	111.6	126.6	15.0	S1.5	June, Three Mile Creek	July	August	September, Tatina River
2	101.8	50.8	51.00	W2	November, Puntilla Lake	January	March	April, Skwentna River
Subtotal Spread 2			**126.0**					
Total Route			315.2 ------------- (315 for narrative purposes in this plan of development [PoD])					

*Seasons in the pipe lay construction sequence are designated as winter (W) or summer (S), followed by a number: winters are W1 and W2 and summers are S0.5, S1.5, and S2.5. S1.5 falls between W1 and W2. W1 is the first winter of pipeline construction; all other seasons are counted from the first year of winter construction. The numbering convention is also carried backward in time from W1: S0.5, W0, W1, and so on. Pipeline mobilization is scheduled for S0.5; pipeline commissioning is scheduled for S2.5. Preliminary civil construction of access roads, airstrips, barge landings, pipe storage yards, campsites, and so on begins in W0, one year before the first winter of pipeline construction.
Note: Daily pipe lay rate (in linear feet) and pipe lay duration (in number of days) for each construction section will be estimated during final design.
**ROW = right of way

3.0 Control Measures

The main purpose of implementing control measures is to prevent erosion and sedimentation and to ensure continued stabilization and rehabilitation of areas disturbed by the pipeline project. In this plan, the control measures use the following terminology:

- Disturbed Area - Any site that has been altered from pre-existing conditions by clearing of vegetation or the underlying soil, including the removal of surface vegetation and roots, grading, earth moving, placement of stockpiles, modification of natural landforms, and other construction-related activities.
- Soil - All unconsolidated, naturally occurring mineral particulate and fibrous organic material.
- Erosion - The transport of soil and rock particles by the action (force) of moving water, wind, ice, or other geological processes.

Control measures would be used to temporarily stabilize the soil, defined by ACGP 2011 as a means of protecting soils from erosion, caused by rainfall and snowmelt runoff or wind, by preserving natural vegetation where possible, or stabilizing exposed soils using soil roughening or a surface cover, including, but not limited to, establishment of vegetation, mulch, soil roughening, erosion control mats, or gravel. Temporary soil stabilization should be distinguished from the goals of the *Stabilization, Rehabilitation and Reclamation Plan*, despite some similarities. Temporary soil stabilization controls would be installed as soon as feasible, in accordance with the project permits.

Final stabilization, as defined by ACGP 2011 and EPA 2007, would be achieved when all construction-related disturbances have been completed and one of the following criteria is met:

- Area has a uniform vegetation cover with a density of 70%, excluding areas covered by permanent structures; or
- Area has equivalent non-vegetation or permanent stabilization measures in place, such as riprap or geotextiles.

Erosion and sediment contol BMPs would be implemented throughout the project to prevent erosion and sedimentation, and to ensure continued stabilization and rehabilitation of areas disturbed by the pipeline project.

3.1 Common Erosion and Sediment Control Best Management Practices

The selection, design, installation, and implementation of erosion and sediment control measures used by Donlin would be in accordance with good engineering practices and manufacturers' specifications. ESC design and installation might be modified based on final engineering design, manufacturer recommendations, and on-site conditions encountered during construction, operations, maintenance, and termination. Engineering "typicals" depicting ESCs are provided in Attachment 1 of this plan. The following subsections discuss common ESC BMPs (best management practices). Additional controls are provided in ADEC 2011.

3.1.1 Mulching

Mulch from chipped or shredded brush would be produced from woody vegetation cleared from the right of way (ROW). Where there is not enough native vegetation, ground cover of sawdust or weed-free straw (certified weed-free by Alaska Department of Natural Resources Division of Agriculture) could be used. Mulch would be applied at 1.5 tons per acre with a uniform thickness that does not inhibit the revegetation of native plants.

3.1.2 Soil Roughening

Soil roughening, also called cat-tracking, would be used on slopes to provide small pockets for trapping runoff and allowing soil infiltration. Surface roughening helps establish vegetation cover by providing a rough soil surface with horizontal depressions. Surface roughening is accomplished by running tracked machinery along the fall line of the slope with the blade raised, making sure that the tracks are parallel and not perpendicular to the slope.

3.1.3 Silt Fence Sediment Barrier

Silt fences would consist of a standard strength geotextile fabric with T-bars or stakes spaced no more than 10 feet (3 m) apart, with at least 2 feet (0.6 m) of post within the ground, or as specified by the manufacturer (P01W-TYEC-02). The above-ground height of the fence would be a minimum of 2 feet (0.6 m), with at least 6 inches (15 cm) of fence below the surface. A trench 6 inches (15 cm) wide and 6 inches (15 cm) deep would be excavated and stakes driven on the downslope side of the geotextile fabric, with a minimum of 6 inches (15 cm) of fabric buried within the trench below the surface. The trench should be backfilled with native soil and compacted. Where ground is too rocky for trenching, a 6-inch (15 cm) ground flap would be covered with rock to hold it in place. For added strength, metal wire fencing could be added as a backing layer to support the geotextile fabric. Wire fencing should be a minimum of 14 gauge with a mesh spacing of 6 inches (15 cm).

Silt fencing may need to be temporarily removed to allow for movement of construction equipment. These barriers would be reinstalled immediately following construction activity and before heavy precipitation. Sediment accumulated in excess of 1 foot (30 cm) or one-third of the height of the fence should be removed and deposited in a controlled location (sediment stockpile) or used in construction activities on site.

3.1.4 Silt Curtain

Silt curtain turbidity barriers would be installed in water bodies (non-flowing and low-flowing water) to prevent sediment-laden water from escaping the construction site. Curtains should consist of a heavy geosynthetic fabric supported by a flotation system at the top and weights along the bottom of the fabric. Curtains should not be placed in high-current water or extend perpendicular to the direction of flow. Curtains should not exceed 12 feet (3.6 m) of water and should span no more than 50 feet (15 m) between joints, or as recommended by the manufacturer, due to the large load placed on the fabric. Curtains should be used for relatively short periods (less than one to two weeks) and removed before risk of freezing.

3.1.5 Wattles

To minimize sedimentation, wattles (P01W-TYEC-07 and P01W-TYEC-08) would be installed on low to moderate gradient slopes (less than 5% slope) over ground with a uniform surface. Vertical stakes at 2-foot (0.6 m) intervals would be used to secure wattles perpendicular to the anticipated flow direction of surface runoff. The base of the wattle should be entrenched 3 inches (8 cm) below surface grade. Sediment trapped by the wattle must be removed to ensure proper function.

3.1.6 Rolled Erosion Control Products

Rolled erosion control products (RECPs) (P01W-TYEC-06) would be installed over uniform surfaces, void of rills or gullies, to ensure that no damage results from excess strain on the mat. RECPs would be stapled together and pinned to the underlying soil, with a minimum overlap of 12 inches (30 cm). The toe (edge) of the mat should be buried to prevent wind and water from lifting and damaging the mat. The mat would be installed over slope breakers, if present, and anchored or keyed into the slope in a 6-inch (15 cm) wide and 6-inch (15 cm) deep trench.

3.1.7 Slope Breakers

Slope breakers (P01W-TYEC-10 to P01W-TYEC-12) would be installed to decrease surface runoff velocity and divert water and sediment toward energy dissipaters. Breakers would be constructed of native soil and be oriented across the slope or perpendicular to the expected flow direction of surface runoff. The slope breaker should be constructed at a 2 to 8% gradient and consist of a 5-foot (1.5 m) wide break that measures 18 inches (46 cm) deep from the trough to the top of the breaker. The outlet of the slope breaker must freely discharge all runoff from the ROW into stable, well-vegetated areas or into an energy dissipater (rock fill dissipater or well-established vegetation). If the vegetation at the outlet of the slope breaker is insufficient to capture sediment and water, an energy dissipater such as coarse rock fill must be used. Slope breakers would be placed at an interval determined by the slope of the ROW as follows, or otherwise determined based on site conditions:

- Slopes 5 to 15%: dikes every 300 feet (91 m);
- Slopes greater than15 and up to 30%: dikes every 200 feet (61 m); and
- Slopes greater than 30%: dikes every 100 feet (30.5 m).

3.1.8 Brush Berms

Brush berms would be constructed as a sedimentation control, using native woody brush and branches in areas where concentrated surface water flows are not expected. Berms would be installed with a good mix of woody brush and branches with a diameter less than 4 inches (10 cm) that are oriented perpendicular to the flow direction of surface runoff. Berms would be buried a minimum of 4 inches (10 cm) below the surface and anchored (lashed) using either wire, nylon, or polypropylene rope with a minimum tension of 50 pounds (23 kg), attached to rebar stakes anchored on either side of the berm. Berms would have a minimum width of 5 feet (1.5 m) and height of 3 feet (0.9 m). Accumulated sediment over 1 foot (0.3 m) or one-third of the height of the berm would be removed and deposited in a controlled location (sediment stockpile) or used in construction activities on-site.

3.1.9 Trench Breakers

Trench breakers would be used as both temporary and permanent ESC measures (P01W-TYTR-01 and P01W-TYTR-02). Temporary breakers would control the movement of sediment-laden water in the trench during construction before backfilling. Permanent breakers would also be installed in areas of sloping terrain to control both groundwater flow through the trench and erosion or alteration of backfill. Final configuration and spacing of breakers would be assessed on-site.

Trench breakers would be constructed from open-weave hemp or jute sacks filled with a mixture of sand and subsoil to minimum weight of 55 pounds (25 kg). Each trench breaker would be keyed into the undisturbed ground along the sides and bottom.

In the winter, trench breakers would be constructed of spray foam, because soil-filled bags would freeze solid and be unable to form a tight seal. The foam would be sprayed into the trench around the pipe to expand and create a seal with the trench wall. The foam would be produced by a two-part chemical stored in 55-gallon drums that are located inside an insulated and heated truck. The hose to the application gun would be insulated and heat traced. It would not be necessary to get down into the trench to install the foam trench breaker.

3.1.10 Dust Control Watering

High-traffic surfaces and other construction surfaces would be watered to increase cohesion of the soil particles and reduce airborne dust. Water would be sprayed from a water truck to add moisture evenly across the surface. Water would be withdrawn only from sites that have a water withdrawal permit, using procedures that meet permit requirements.

3.1.11 Rock Energy Dissipaters

Rock energy dissipaters would be used to reduce the concentrated flow of water and its erosion potential. Dissipaters would consist of crushed rock or natural gravel placed at the end of discharge points or as lining within ditches. The material and placement would be determined during final engineering design.

3.2 General Construction Best Management Practices

The pipeline project would implement ESC measures during clearing, grading, excavation, or other surface-disturbing activities, or as soon as feasible if prevented temporarily by snow cover, frozen ground, or weather conditions deemed to be unsafe. The project area spans approximately 315 miles (507 km) across varying terrain and climates, resulting in differences in the timing of snowmelt and thawing of the seasonal frost in the ground. This will require flexible scheduling and on-site determination of when it is feasible to install ESC measures. No treatment chemicals would be used to reduce erosion or sedimentation.

3.2.1 Clearing of Pipeline Right of Way and Support Areas

The pipeline project has been designed and planned to minimize the area of surface disturbance and the potential for soil erosion. Clearing would be required for development of the pipeline ROW, shoofly roads (roads along the pipeline corridor built to bypass obstacles such as a river or steep slope), access roads, borrow material sites, pipe storage yards (PSYs), barge landings, camp pads, temporary airstrips and airstrip upgrades, and campsites. The clearing of vegetation would be phased where possible. Clearing for the pipeline ROW and support areas would take place in early winter ahead of pipeline mobilization and construction.

A 100-foot (30.5 m) wide construction corridor would be cleared of vegetation to allow for pipeline construction. Survey markers and flagging tape would be used to clearly indicate land permitted to be cleared of vegetation. This would reduce exposure of erosive soils in areas not permitted to be cleared.

Additional temporary workspaces might need to be cleared for safe pipeline construction at horizontal directional drilling (HDD) locations or other locations dictated by construction needs and site conditions. Also, temporary support areas for staging materials and equipment, barge landings, camp facilities, airstrips, water extraction sites (PoD, Section 8.4), and access roads would be needed to support construction.

The clearing crew would cut and remove trees and brush. Brush and woody material would be mulched and spread on the ROW, or stockpiled for later use to prevent soil erosion and promote stable ground for revegetation.. Temporary brush berms would be constructed to make use of extra woody vegetation not required for the initial mulch cover.

Maintenance Clearing of Right of Way

After construction, the permanent ROW would be cleared of brush and shrubs every 10 years or as required for monitoring, operations, maintenance, or safety. Minimal disturbance to the underlying ground and exposure of soil are expected during this activity. Personnel knowledgeable in ESC practices would monitor construction activities, conduct follow-up inspections, and take the necessary ESC actions as required.

3.2.2 Construction, Pipe Installation, and Cleanup

Pipeline construction would require installation of temporary ESC measures before final cleanup and stabilization. Personnel would inspect and monitor ESCs and support contractors in determining the appropriate measures required by daily construction activities and changing seasonal conditions.

Temporary ESCs might include diversion channels, trench breakers, silt fences, wattles, erosion mats, and geotextile covers. The immediate level of erosion control established would depend on the local weather and ground conditions at each site.

Soils exposed by trenching would be scheduled to keep pace with pipe lay, and thus reduce the length of time that trench spoil is exposed above the natural grade. Backfilling and grading would commence immediately after pipe lay. Trench dewatering may be required before pipe lay and backfilling. Pumps with screened intake hoses would be used to dewater trenches. If required, energy dissipaters or other ESC measures would be used. Trench plugs would be installed at the base of slopes adjacent to water bodies and wetlands to minimize the inflow of sediment-laden water. Trench plugs would be permanently installed on slopes of less than 5% (refer to Section 3.2.8 for additional information).

Stabilization of the backfilled trench could be a multi-year process in some areas, particularly where fine-grained, ice-rich soils or wetlands exist. If overland drainage is not properly managed, the proposed pipeline trench could potentially intercept the flow and lead to erosion of the trench backfill. Trench plugs and diversion channels would be installed at these locations. In addition, some areas could be covered with mulch and erosion control mats that do not inhibit vegetation growth. If necessary, some areas could be seeded with Alaska certified weed-free products at the earliest opportunity to minimize erosion (refer to the *Invasive Species Prevention and Management Plan* for additional information).

Final cleanup, erosion control, and reclamation work would commence immediately following backfill operations, or as soon as it is feasible and safe to proceed. Cleanup crews would follow behind the backfill crew and perform all cleanup, and reclamation of cuts when possible, and carry out additional ESC measures.

Personnel would go back over the ROW during the summer after a winter season to address any erosion and sedimentation concerns that arise during breakup/freshet, as well as any reclamation problems with the trench line and working side. They would also assess permafrost degradation. Double coverage of erosion control and reclamation issues in permafrost terrain constructed during the winter would ensure that important concerns related to permafrost are addressed, including related aspects of erosion. For a construction section that begins during the summer, the reclamation crew would follow the cleanup crew during the same summer.

A temporary travel lane would be required along the pipeline route to allow construction crews access. ESC measures associated with this travel lane would be in place during its use. During the summer construction season, any access roads and other active support sites would be watered as needed to prevent and control dust (refer to the Dust Control Plan for additional information).

3.2.3 Dewatering

During construction, dewatering might be required from, for example, the development of trenches and material sites. Dewatering would meet the following requirements:

- Review the location of local drinking water wells, ADEC-identified contaminated sites, or other waters. If the dewatering activity might impact a local drinking-water well, or is located less than one mile from a contaminated site, the activity could be covered under ADEC Excavation Dewatering General permit (2009DB003 or most current version). In this case Donlin Gold would apply for the required permit and comply with its stipulations.

- All ACGP eligible dewatering activities, including discharges from dewatering of trenches and excavations, would be treated with appropriate control measures such as sediment basins or traps, dewatering tanks, weir tanks, or filtration systems to remove sediment.

3.2.4 Revegetation

The most significant impact to vegetation would be clearing of the ROW and removal of the vegetative mat during grading to develop work pads and the trench line. Revegetation procedures and strategies are outlined in the *Stabilization, Rehabilitation, and Reclamation Plan*. Areas of vegetation or timber damaged or harmed directly or indirectly by the construction, operation, maintenance, or termination of any part of the proposed pipeline would be identified and corrective action taken, as appropriate and consistent with the approved *Stabilization, Rehabilitation and Reclamation Plan*, other applicable plans and regulatory requirements, or as agreed with landowners.

Winter construction activities would be done from gravel and ice pads to minimize disturbance to the surface and allow for more immediate recovery of vegetation. Trees and brush within the ROW should begin to grow back almost immediately after construction. The vegetative mat disturbed within the limits of the trench line and the workpad surface would reestablish more slowly. If seeding is determined to be necessary, Alaska certified weed-free products, in compliance with the *Invasive Species Prevention and Management Plan*, would be used to reduce the potential for introduction of invasive plant species. Mulch would allow for more immediate recovery of vegetation by acting to stabilize the soil and conserve moisture, allowing for natural revegetation of native plants.

3.2.5 Off-Road Vehicle Access Management

Authorized vehicle access to the pipeline ROW and to other support facilities would be required after construction, for operation, maintenance, or monitoring. Whenever possible, off-road vehicles should access the ROW while the ground is frozen enough to protect the vegetative cover from damage. However, it is possible that off-road vehicle access would also be required during other periods of the year. In those situations, appropriate engineering practices and ESC measures would be used to protect water bodies and wetlands from erosion and sedimentation.

Authorized or unauthorized public use of the pipeline ROW following construction could potentially cause erosion and damage to existing ESC measures, or create the need for new ones. Donlin Gold would work as needed with the appropriate landowner to determine the best course of action, while working within the scope of regulatory compliance and our responsibilities. Examples of potential control measures include posted notices, warning or directional signs, flagging, and barricades. Maintaining traditional access for hunting and fishing by the public is important and Donlin Gold would work with the appropriate landowners to address concerns about access during and after construction.

Even though it is Donlin Gold's plan to remove all culverts, we would work with the landowners to determine whether any culverts or other permanent ESC measures should remain in place beyond the construction period, with the aim of alleviating off-road vehicle concerns.

3.2.6 Permafrost and Thaw-Unstable Soil

Seasonal frost, permafrost, and ground ice are important considerations to ESC. The overall design, construction, and operation of the pipeline have been planned to reduce the impact to permafrost. However, thawing of ice-rich, thaw-unstable permafrost soils or thermo-erosion is anticipated to occur in response to changes in surface drainage patterns, removal of insulating vegetative cover, and excavation. The greatest potential for thermo-erosion would be in areas where ice-rich soils are exposed in cut slopes, potentially resulting in thaw flow slides, gullying, ground subsidence, ponding of surface water, and possible siltation of nearby streams.

Before the final design of the pipeline, additional geotechnical work would be completed to determine ice content along the trench line and below the expected depth of excavation. The specific ROW and trenching for sections with thaw-unstable permafrost would be determined during final design and review of this secondary geotechnical investigation.

Donlin Gold would minimize thermal degradation and erosion of thaw-unstable permafrost initially through use of low-impact construction methods conducted in the winter from an ice pad. The pipeline would be operated near seasonal ambient ground temperature to minimize thermal disturbance to the surrounding permafrost. However, final design would determine whether sections of the pipe need to be insulated to reduce heat transfer between the pipe wall and the ground.

Permafrost might be encountered adjacent to some water bodies. Taliks (unfrozen zones surrounded by permafrost) could occur beneath and directly adjacent to the shoreline where terrestrial permafrost is present. Unfrozen thaw bulbs could also be encountered beneath minor ponds, wetlands, and creeks. During trenching, an inflow of water might result from excavation through taliks and minor thaw bulbs. Trench plugs would be used under these conditions to limit the flow of sediment-laden water, and dewatering would be conducted in accordance with the project permits.

Retrogressive (cyclic) thaw could potentially occur on slopes at the edge of water bodies if ice-rich sediments are thermally disturbed by construction, or if subsequent detachment of the active layer occurs. These processes have the greatest chance of taking place over the first thaw season following construction, and often require the exposure of massive ground ice (soil moisture content greater than or equal to 250% of the dry weight of the sample). The preliminary geotechnical investigations have not identified extensive bodies of massive ground ice commonly associated with this process. Retrogressive thaw would be assessed on a case-by-case basis. Temporary silt curtains and silt fences would be installed as required, to limit sedimentation into adjacent water bodies. In some cases the placement of fill over exposed sections of ice-rich permafrost, or other forms of insulation, could be used to reduce thaw and reestablish the seasonal active layer. In other cases, natural rehabilitation of the site from ongoing thaw might be a better approach.

The following BMPs and ESC measures would be implemented to minimize the thermal degradation and erosion of permafrost soils as necessary:

- Trees and brush across these sections of the ROW would be cleared only from essential areas required by construction, and removal of the surface vegetation mat would be avoided where possible;
- In ice-rich, fine-grained soils, near-vertical trench cuts would be made and pipe lay would commence immediately;
- Excavation of the trench line would involve segregation of compressible surface organic material;
- Ice-rich, thaw-unstable soil would be segregated from thaw-stable soil due to its potential release of water upon thawing;
- Over-excavation of the trench would take place if massive ice or high ice-content materials are encountered within the first 10 feet (2 meter) below the bottom of the trench (P01C-SCI1-01);
- Thaw-stable pipe bedding and backfill would be used for over-excavated areas;
- Roaching (mounding of soil over trench line to compensate for settlement) over the thaw-stable backfill would be conducted to account for initial settlement during the thawing season;
- Some ground ice or ice-rich soil produced by excavation would be moved to controlled stockpiles, as required (refer to Section 3.2.12);
- ESC measures, such as silt fences and wattle, would be installed along the roached trench line where ice-rich, thaw-unstable soil exists;
- Mulch would be placed over exposed soils to provide insulation and inhibit surface erosion;
- Ground insulation or thermal blankets would be installed if required to thermally stabilize the ground; and
- Earthen berms and silt fences would be installed as needed to control sediment if retrogressive (cyclic) thaw is found to occur.

Post-construction inspections would be conducted along permafrost-affected sections of the pipeline to observe site conditions, and corrective action would be taken where needed (refer to Section 4.0). The level of monitoring would be determined from the estimated inspection schedule or as needed to achieve soil stabilization.

3.2.7 Water Body and Wetland

The project would require burial of the pipeline beneath streams, rivers, and wetlands. Perennial water bodies would be crossed by the pipeline. The three modes of trenching across water bodies are open-cut for flowing and non-flowing waters, open-cut dam and pump, and open-cut dry flume. Horizontal directional drilling (HDD) will also be used for pipeline crossings where traditional means are not feasible. This project does not affect any impaired water body (ADEC 2013a) and dewatering would not be conducted within one mile of the ADEC mapped contaminated site (ADEC 2013b). Installation of the pipeline across most wetlands and water bodies would take place in the winter when frozen ground and snow are present.

The following BMPs and ESC measures would be implemented at water bodies and wetlands as necessary:

- Construction precautions would be taken for activities across water bodies and wetlands to minimize terrain disturbance;
- Clearing of wetlands would be limited to trees and shrubs cut flush to the ground, with stump removal restricted to the trench line;
- Trench plugs would be used to prevent sediment-laden water from entering the water body and to decrease the potential for erosion of backfill;
- Trench breakers would be installed above and below wetlands that occur on slopes adjacent to the trench line (P01W-TYTR-01 and P01W-TYTR-02);
- Trench spoil would be segregated by composition (organic vs. non-organic spoil) during excavation and backfilled using the original stratigraphic sequence to minimize impacts on local ground water flow through the wetland thermal disturbance to permafrost;
- Trench spoil would be placed at least 30 feet (9.1 m) from the edge of a receiving water body or wetland (refer to Section 3.2.11 for additional information on water approach stockpiles);
- Excess spoil not immediately used to backfill the trench would be moved to an appropriate area designated for stockpiling (refer to Section 3.2.10);
- Silt-laden water produced from trench dewatering would be pumped through filter bags (P01W-TYEC-03) and discharged into an energy dissipater;
- Stabilization of the water body shoreline would include installation of erosion control matting to armor the approach where disturbance has occurred;
- Slope breakers would be installed to divert water toward the surrounding terrain and reduce runoff from areas upslope of the approaching water body or wetland;
- Wattles, silt fences, brush berms, or RECPs (rolled erosion control products) would be installed parallel to the shoreline across the entire construction ROW to intercept sediment before it enters the receiving water body or wetland;
- If required, temporary silt curtains would be installed and used as a turbidity barrier along the edge of water bodies and wetlands. The curtains would be installed during periods of active construction;
- Erosion control mats or other RECPs would be installed over graded banks;
- Water-body banks would be graded to their original configuration, or to a more stable configuration if original banks were originally unstable; and
- Grading would be performed to minimize ponding of surface water and allow for revegetation.

At water-body approaches, temporary ESC measures would be removed only when vegetation on the bank has progressed to the point where it can prevent erosion and keep sediment from entering the receiving water body.

Water bodies would be temporarily bridged to allow for the passage of equipment along the ROW (P01C-TYBD-01). Bridge type would be based on final design but might include flex-float (P01C-TYBD-02), rock flume (P01C-TYBD-03), timber mat (P01C-TYBD-04), or portable water-body bridges (P01C-TYBD-05). Installation would require careful consideration of the aquatic ecosystem and the surrounding stream banks. ESC controls temporarily removed for equipment passage and would be immediately reinstated.

The pipeline ROW would extend across minor drainage areas, including ephemeral creeks connecting wetlands and water bodies. Culverts would be temporarily installed, where appropriate and in compliance with the project permits, to allow equipment passage, ensure the natural flow of water, and reduce equipment tracking of soil directly into the water. Inlet and outlet protection would be used.

3.2.8 Slopes

The pipeline route traverses slopes of varying grades and would expose non-cohesive, fine-grained silts, sands, and gravels. Slope cuts would be required in particularly steep and hummocky terrain to allow for passage of construction equipment during thawed or frozen surface-soil conditions. These areas would require construction of temporary and permanent erosion-control measures, as would any sloping area that has been disturbed by construction activity. Winter construction would typically reduce surface disturbance along the working ROW of some slopes.

ESC measures would be required to prevent channeling of water along the trench line and to allow for drainage. Excessive thaw and mechanical settlement of backfill materials in the trench could occur in some sections of the route, resulting in ground depressions and localized ponding of water. Water flow along the trench line could potentially erode the backfill materials.

Slopes disturbed by construction would be stabilized using both temporary and permanent stabilization techniques. The following ESC measures would be implemented as required on slopes:

- Steep slopes with erodible soils would use slope breakers to divert water and sediment toward stable buffer vegetation zones or energy dissipaters, and fiber/geotextile or erosion mats would be installed to reduce sediment mobility until vegetation is reestablished;
- Slope breakers would be installed with the following spacing: slopes less than 5%, no breaker required; slopes 5 to 15%, breaker every 300 feet (91 m); slopes greater than 15 and up to 30%, breaker every 200 feet (61 m); slopes greater than 30%, breaker every 100 feet (30.5 m). Steep slopes with a 20% or greater grade occurring over a slope length greater than 25 feet (7.6 m) would be identified in the final design plans;
- Silt fencing and wattles would be used to retain sediment and minimize erosion;
- Final contoured slopes would include soil roughening and/or mulching as needed to reduce runoff, increase infiltration, prevent rill and gully formation, and provide a protective cover over exposed soil until regrowth of vegetation; and

- Seeding of disturbed slopes, where required, would commence as soon as feasible in order to reestablish vegetation using Alaska certified weed-free products.

Use of these measures would be based on final design and on-site evaluation during construction.

3.2.9 Horizontal Directional Drilling

Horizontal Directional Drilling (HDD) construction techniques would be used as determined in the PoD and final pipeline engineering design. HDD operations will be addressed in detail in the HDD plan, which would be designed to meet regulatory requirements for the management and disposal of drill cuttings mud. Site-specific plans would include information such as:

- Site layout, excavation, and equipment staging;
- Expected geotechnical conditions, geology, permafrost, ground ice;
- Entrance and exit bell hole locations;
- HDD design; and
- Reaming and back-pulling operations.

The following ESC measures would be considered at HDD locations:

- HDD sites would be staked before construction to limit disturbance of native vegetation and ensure operational efficiency and safety;
- Visual inspection of the ground surface and water bodies would be conducted throughout drilling to detect inadvertent release of drill mud and fluid;
- Silt fences, straw bales, or wattle would surround the spoil stockpiled adjacent to the bell hole excavated for drill entry and exit (P01C-TYWC-06);
- Bell holes would be backfilled upon completion and the surface would be contoured;
- Sediment-laden water produced during the operation would be pumped from the bell hole through filter bags and discharged away from receiving water bodies toward energy dissipaters;
- Excess drilling mud and fluid produced during drilling would be stored in a containment pit. All drill mud and fluids would be removed from the site when no longer required; and
- Cleanup, transportation, and disposal of drilling fluids would be conducted in accordance with relevant regulations and permit stipulations.

Inadvertent Release Measures

Drilling mud (fluid) used in HDD poses a low risk to water bodies and wetlands. However, drilling mud could potentially be released into the overlying water body along lateral or vertical pathways where unconsolidated gravel, coarse sand, and fractured bedrock occur. This is known as a frac-out release.

After HDD begins, specific monitoring would need to be done to determine whether a frac-out occurs. The mud mixture would be adjusted to match the conditions of the subsurface. The pressure levels would be set as low as possible and closely monitored, to ensure that the pressure on the drilling fluid is set to match the formation. The pressure should not exceed what is needed to penetrate the formation. Any significant drop in the pressure or drop in mud return could indicate a potential frac-out and drilling would be halted immediately.

Details regarding response to a potential frac-out or drilling fluid release would be addressed in the Spill Prevention Control and Countermeasures Plan.

3.2.10 Temporary Soil Stockpiles

A majority of the material excavated during trenching would be used as backfill, or as required during final surface contouring. Some excavated material would be temporarily stockpiled. Additional consideration would be given to temporary stockpiles located in alpine environments to allow for the effects of rain, snow melt water, wind, characteristics of the surrounding terrain (such as slope and vegetation), and composition of material (such as organic or soil, permafrost, ground ice). The following BMPs and ESC measures would be used at stockpiles as needed:

- Temporary stockpiles would be placed at an appropriate distance from receiving water bodies and wetlands to control sedimentation;
- Silt fencing and wattles would surround all stockpiles not actively used for daily construction;
- Temporary stockpiles would be contoured with a low profile and soil roughening would be used to reduce soil erosion;
- Inactive stockpiles would be covered with plastic if there is a risk of sediment erosion due to high-risk weather conditions (rain and wind storms frequently bring greater than 0.5 inch [1.3 cm] of rain); and
- Stockpiles would be covered with plastic if there is a potential for increased runoff to the surrounding area.

3.2.11 Water Approach Soil Stockpiles

Three methods of construction are proposed for trenching across water bodies where HDD is not used: open-cut for flowing and non-flowing waters, open-cut dam and pump, and open-cut dry flume. Each method would require the temporary stockpiling of excavated material. The following BMPs and ESC measures would be implemented for stockpiles near water approaches as needed:

- Stockpile materials would be segregated according to the location from which they were excavated (water-body spoil vs. terrestrial spoil);
- Stockpiles would be a minimum distance of 30 feet (9.1 m) from the bank of the receiving water body;
- Silt fencing, wattles or temporary containment berms would be installed around the side perimeters and across the front edge upslope of the receiving water

body (refer to P01W-TYEC-09, and P01C-TYWC-01 to P01C-TYWC-05); and

- Silt curtains would be used as temporary turbidity barriers to contain sediment along the bank.

3.2.12 Ice-Rich Spoil Stockpiles

Ice-rich spoil excavated from construction sites would be segregated from thaw-stable soil, due to its potential to release water upon thawing. Ice-rich trench spoils would be roached over the trench line when present, but not used as pipe bedding. In some cases it may be necessary to remove the ground ice or ice-rich soil and stockpile it for later use. The following BMPs and ESC measures would be implemented for stockpiling of ice-rich spoil as needed:

- Ice-rich materials would be stockpiled separate from thaw-stable trench spoil and permitted to thaw and drain before use in construction;
- Ice-rich spoil stockpiles would be located on level thaw-stable ground downslope of the pipeline ROW; and
- Additional ESC measures would include controls that are noted in Section 3.2.10.

3.2.13 Brush Stockpiles

Temporary brush stockpiles might be required at some locations along the ROW where the material is not converted into mulch during initial clearing. The material would be used to construct brush berms and later mulched to meet construction needs. Brush berms would be installed using the guidelines in Section 3.1.8.

3.2.14 Snow Stockpiles

Snow management is important to the safe passage of construction equipment and for providing an exposed surface from which efficient and safe work can take place. In most cases snow would be furrowed and leveled across areas directly adjacent to the plowed surface. The following BMPs and ESC measures would be implemented for snow stockpiles as needed:

- Snow stockpile sites would be designed specifically to store the snow;
- Stockpiles would use water diversion ditches to control the drainage of melt water toward well-established vegetation or energy dissipaters; and
- Discharge of melt water would be in accordance with the approved pipeline project permits.

3.3 Pipeline Construction Facilities Best Management Practices

The following BMPs (best management practices) are associated with the construction and use of pipeline support facilities, material borrow sites, and related areas.

3.3.1 Material Borrow Sites

Material borrow sites would be authorized separately from the pipeline ROW, and would require ESC measures. Material stockpiles would follow the ESC stockpile guidelines outlined in Section 3.2.10. In addition to these ESC measures, the following would be implemented as needed:

- Material borrow sites would be excavated in stages to keep pace with construction demands, while minimizing the area of disturbance and reducing the potential for soil erosion;
- Stabilization, rehabilitation, and reclamation would begin when sites are no longer needed, to reduce the potential for soil erosion and sedimentation;
- Any compacted areas would be ripped and graded to conform to the surrounding topography, covered with any available growth media, and scarified to allow natural revegetation of native plants; and
- Fertilization and/or seeding would be performed on a case-by-case basis as needed. Any high walls would be left in a stable condition.

3.3.2 Pig Launching and Receiving Sites

Pig launchers and receivers would be installed at the following locations: MP 0 -- launcher/receiver site with compact footprint; MP 0.4 -- launcher/receiver at compressor station; approximately MP 156 -- launcher/receiver near Farewell; and a receiver at the mine site. ESC measures are not expected to be required for the operation of these sites, but would be assessed and implemented as needed during the construction phase.

3.3.3 Pipeline Support Areas

Pipeline support areas would be developed concurrent with installation of the pipeline. These could include electric transmission line, fiber optic cable, temporary camps, temporary airports, pipe storage sites, barge sites, and other related facilities. Disturbance at these sites would require ESC until final soil stabilization is achieved.

3.3.4 Temporary Pipeline Construction Campsites

Temporary camps would be required to support pipeline construction, as outlined in the project PoD. The following BMPs and ESC measures would be implemented at the location of temporary pipeline construction campsites, as needed:

- Soil disturbance during construction of the campsites would be minimized and soil would be stabilized using temporary erosion mats or other means of surface cover, such as mulch and gravel;
- Gravel pads or temporary construction mats would be used to provide a stable base for camp infrastructure and equipment;
- Water would be diverted along the perimeter of the campsites using temporary diversion ditches that discharge toward well-established vegetation or rock dissipaters;

- Silt fences or wattle would be installed as needed along the outer edge of the diversion ditch to capture any additional sediment;
- Surface watering would be used in high-traffic areas to control dust;
- Cleared snow would be deposited in designated snow stockpiles on site (refer to Section 3.2.14 for additional information on snow stockpiles); and
- Construction campsites would be decommissioned as soon as they are no longer needed, following the Stabilization, Rehabilitation and Reclamation Plan.

3.3.5 Temporary Water Wells

Water wells could be developed to supply the construction camp with potable water. Where feasible, the water wells would be installed inside the areas cleared for camp construction; however, additional clearing of vegetation would be required if the well is located outside of the area. The following ESC measures would be implemented at the location of temporary water wells, as needed:

- Wattle and silt fencing would surround the disturbance site during drilling of the water well;
- Cuttings and drilling mud would be disposed of using means that would not contribute to sedimentation; and

Well abandonment would be conducted in accordance with ADEC regulations (18 AAC 80.015). Abandonment procedures would include:

- Removal and disposal of pumps and piping, removal of the casing where possible, and plugging of the well with an approved sealing material at total depth;
- Removal of the collar, minor grading around the well site, and reclamation of the site as outlined in the Stabilization, Rehabilitation, and Reclamation Plan; and
- Installation and maintenance of silt fencing or wattle until final stabilization of vegetation.

3.3.6 Temporary Water Withdrawal Sites

Water withdrawal from lakes and streams for HDD, ice road construction, or hydrostatic testing would be planned and executed in accordance with the requirements of the related permits and authorizations. Screened intake hoses would be elevated above the bottom of the water body to ensure that benthic organisms are not harmed and sediment is not put into suspension, and discharge would be controlled (P01W-TYEC-01). Direct discharge of water into withdrawal sites will not take place without the required permits.

3.3.7 Temporary Airstrips and Existing Airports

Temporary airstrips would be required to support pipeline construction. Construction and upgrades of airstrips would involve clearing of vegetation, grading, contouring, and installation of water diversion berms and drainage. Soil disturbance would be minimized by using existing airstrips and airports. For new and upgraded airstrips, improvements to the runway grade and surrounding facilities would be required. In many areas, locally sourced aggregate with low erodibility would be used as a base for the landing strip and support facilities. This would result in a low potential for erosion and sedimentation from wind and water. Surface watering would be used to control dust.

Temporary airstrips would be decommissioned and the land reclaimed as defined by the Stabilization, Rehabilitation and Reclamation Plan. Reclamation of these areas would be consistent with regulatory requirements and would include cleaning of the site, removal of all equipment and infrastructure, and contouring to blend with the landscape. Temporary ESC measures would be used during decommissioning to prevent erosion and sedimentation. Mulching and soil roughening would be used to reduce erosion until vegetation is re-established.

3.3.8 Temporary Pipe Storage Yards

Temporary pipe storage yards (PSYs) would be required along the pipeline ROW. The following BMPs and ESC measures would be implemented as needed at the location of PSYs:

- Surface vegetation would be stripped from the PSYs. Gravel pads or construction mats would be laid over the soil surface;
- Pipe would be elevated from the pad surface with spacers;
- Runoff from PSYs would be captured in ditches and diverted toward energy dissipaters;
- As required, wattles or silt fence would be installed around the perimeter of the PSYs to minimize any potential transport of sediment from the sites;
- PSY entrances and exits would be designed to the minimum feasible size required for safe movement of equipment into and out of the site. If required, sediment tracking from the site would be reduced by installation of coarse gravel pads at the entrance and exit of the sites;
- PSYs no longer in use would be decommissioned, and structures, equipment, and any remaining materials or debris would be appropriately removed and the area visually checked for any signs of contaminated soils;
- Compacted areas would be ripped as necessary to mitigate the compaction effects, graded to blend with the surrounding topography and facilitate drainage, covered with any available growth media, and scarified to allow natural revegetation;
- Temporary ESC measures would be installed and maintained as needed until final stabilization; and
- Fertilization and/or seeding would be used where appropriate following the guidance of the Stabilization, Rehabilitation and Reclamation Plan.

3.3.9 Temporary Access Roads

Temporary access roads would be required for airstrips, borrow material sites, campsites, water withdrawal sites, and any other authorized temporary-use areas.

Spray trucks would be used for dust-control watering of access roads and other construction zones as needed.

3.3.10 Temporary Barge Landings

Temporary barge landings would be required at two sites to efficiently transport pipe to the PSYs along the ROW. These two sites are located where the pipeline ROW intersects the Kuskokwim River, on the east and west shores (refer to PoD for specific locations).

ESC measures such as silt fencing, wattle, or silt curtains would be implemented during construction of the landing sites. Clearing of vegetation would be followed by contouring, compaction, and placement of shoreline mats to armor against erosion and provided a foundation for equipment. Details regarding the temporary barge landings would be developed during detailed engineering.

3.3.11 Electric Transmission Line Right of Way

A medium-voltage electrical transmission line would be required to power the compressor station at MP 0.4. The transmission line would extend approximately 8.1 miles (13 km) from Beluga to the compressor station. Construction would require the clearing of vegetation along a 30-foot (9 m) wide ROW (right of way) to install support members, string the elevated overhead lines, and access the site for post-construction maintenance.

Vegetation cleared from the transmission ROW would be mulched and spread over the ground surface to prevent erosion. Auguring would be required for the installation of the support members. The soil cuttings produced would be collected at the surface and deposited in a controlled sediment stockpile or used on site for construction. Wattles or straw bales would be used to contain soil at each drill site. Cleanup would take place immediately following the pouring of concrete, if required by the final design. Temporary silt fences, wattles, or other appropriate ESC measures would be used around the transmission-line support members.

3.3.12 Fiber Optic Cable Right of Way

A fiber optic communications cable would be buried in the pipeline ROW to the mine site, with the possible exception of the two above-ground fault crossings. Information regarding the origin of the fiber optic cable is not currently available, pending detailed engineering design. It is anticipated that installation of the fiber optic cable would be conducted concurrently with pipe lay to minimize disturbance. ESC for the pipeline ROW would be applied as outlined in the preceding sections.

4.0 Inspection, Maintenance, and Corrective Action

Inspections would be performed by personnel with knowledge of ESC practices. It will also be the responsibility of the contractors and sub-contractors to ensure that controls and BMPs are working effectively. The contractors and sub-contractors would be responsible for taking corrective actions.

4.1 Estimated Schedule

Soil erosion and sedimentation are best prevented by frequent inspection, evaluation, and maintenance according to ESC measures, and prompt correction of actions that are noncompliant with project permits. To this end, ESC inspection, monitoring, and documentation would be conducted in compliance with the permit requirements. Estimated inspection periods would be limited during the winter, when frozen ground and snow cover are present, and whenever inspection activities are deemed unsafe. Inspection frequency would be in accordance with the permit requirements described in Section 6.0 of the 2011 CGP. Table 4-1 presents the estimated inspection schedule for the pipeline project.

4.2 Inspection Locations

The estimated inspection schedule outlined in Section 4.1 would take place at active and temporarily stabilized sites where construction-related disturbance to the terrain has occurred.. Inspections would be conducted 0.25 miles (0.4 km) above and below each access point of a shoofly road, ROW, or other similar feature in order to limit additional disturbance from access vehicles. Periodic aerial surveillance would be used throughout the project to assess conditions over the entire construction corridor and identify noncompliance during times when field monitoring crews are unable to immediately evaluate a site. Campsites, borrow material sites, stockpiles, and other locations where soil disturbance has occurred would be inspected in accordance with applicable regulations and permit requirements.

4.3 Site Inspection and Maintenance

The following subsections provide guidance for evaluating the condition and effectiveness of ESC measures. Site-specific conditions might require evaluation based on additional criteria not outlined in this section.

4.3.1 General Site Evaluation

ESC measures that are effectively preventing and controlling erosion and sedimentation will contribute to stabilization of the terrain. Field inspections would evaluate the overall condition of the site, as well as the performance and integrity of the ESCs. Corrective actions would be taken when controls are damaged or ineffective in preventing and controlling erosion and sedimentation from disturbance sites.

Items that would be evaluated include:

- Relative degree of vegetation recovery;
  - Well-established, moderate, or poorly established vegetation;
  - Aerial coverage of vegetation vs. bare soil (not including on-site infrastructure);
- Evidence of soil erosion, rills, gullies, or subsidence;
- Condition of ESC controls, such as visible damage, deteriorated material, or areas clogged or loaded with debris or sediment; and
- Presence of suspended sediment sourced from disturbance sites.

Table 4-1: Estimated Erosion and Sediment Control Inspection Schedule

Period	Type	ESC Inspection Frequency	Description
Spring, summer, and fall	Active construction sites	Ongoing with construction	Construction is actively taking place or is ongoing in the location; cleanup has not occurred.
	Under continuous precipitation or sequential storm events	Twice every seven calendar days	Storm event defined by a rainfall that produces more than 0.5 inches (1.3 cm) of precipitation in 24 hours and that is separated by 1 to 3 days of dry weather.
	Post-construction cleanup	Immediately following cleanup	Locations no longer undergoing active construction where cleanup and reclamation crew has completed all required duties.
	Temporary stabilized sites[1]	At least once every 30 calendar days	Temporarily stabilized sites that have controls installed to protect soils from erosion, but have not achieved final stabilization.
	Active HDD sites	Ongoing during HDD operations	Horizontal directional drilling sites where active drilling activities are taking place; otherwise select other inspection frequency.
nter shutdown periodWi[2]	Temporary stabilized sites, pre-winter inspection	14 days after fall freeze-up	Temporarily stabilized sites. Last inspection 14 days after fall freeze-up, defined by air temperatures predominantly below 32°F (0°C). Estimated to be the date that historically has a 20% probability of this temperature threshold.
	Temporary stabilized sites, pre-spring inspection	Start inspections 21 days before spring thaw	Temporarily stabilized sites. Start inspection 21 days before spring thaw, defined by air temperatures predominantly above 32°F (0°C). Estimated to be the date that historically has a 20% probability of this temperature threshold.

1 A temporarily stabilized site is defined by ACGP 2011 as a location with means of protecting soils from erosion by rainfall, snow melt, runoff, or wind, with surface roughening or a surface cover, including, but not limited to, establishment of vegetation, mulch, soil roughening, erosion control mats, or gravel.
2 Winter shutdown period only applies to temporarily stabilized sites.

4.3.2 Inspection of Erosion and Sedimentation Controls

Inspection of ESC measures would be performed to determine whether any damage to the control has occurred. If damage is identified, the extent and its impact on performance of the control would be assessed. The required corrective action would be taken to mitigate erosion, sedimentation, and the release of hazardous materials to the environment (refer to Section 4.4 for additional information on corrective actions).

4.4 Corrective Action Procedures

Corrective actions would be taken as soon as feasible if new BMPs or ESC measures are needed, or if current measures are deemed ineffective or in need of maintenance. Corrective actions would be recorded on a Corrective Action Log in accordance with permit requirements. The log could be expected to include the dates on which the corrective action was initiated and completed, description of the corrective action, and identification of the person(s) and company responsible for performing the action. Documentation would clearly refer to the date that the need for corrective action was originally identified. Notes on the action taken to correct the issue would be included, in addition to information on whether it is a reoccurring problem at the site.

5.0 Reporting

The ESC inspection, monitoring, and maintenance would be reported in accordance with the permit requirements.

5.1 Inspection Reporting

An inspection report would be completed for each site inspected and at minimum would include:

- Name, title, company, and qualifications of the person conducting the inspection;
- Inspection date;
- Weather observations;
- Inspection findings;
    - Condition of site and ESC measures;
    - Description and location of any noncompliance findings;
    - Description and location of ESC measures requiring maintenance or replacement;
    - Locations where additional ESC measures are required;
- Corrective actions, description, location, and completion date;
- If the site was unable to be inspected, the circumstances preventing the inspection would be noted, such as unsafe conditions; and
- Additional comments.

Each inspection would be signed by the inspector, indicating that the report is true, accurate, and complete to the best of their knowledge and belief. If a noncompliance event that might endanger health or the environment is found to have occurred, the ADEC would be notified in accordance with permit requirements.

5.2 Record-Keeping

The ESC plan and records of construction activities (planned and otherwise), including implementation of ESC techniques, inspection, monitoring, maintenance, and mitigation activities, would be retained by Donlin Gold in accordance with permit requirements.

6.0 References

ACGP 2011. Alaska Pollutant Discharge Elimination System General Permit for Discharges from Large and Small Construction Activities ("Alaska Construction General Permit"). Anchorage, Alaska: Alaska Department of Environmental Conservation.

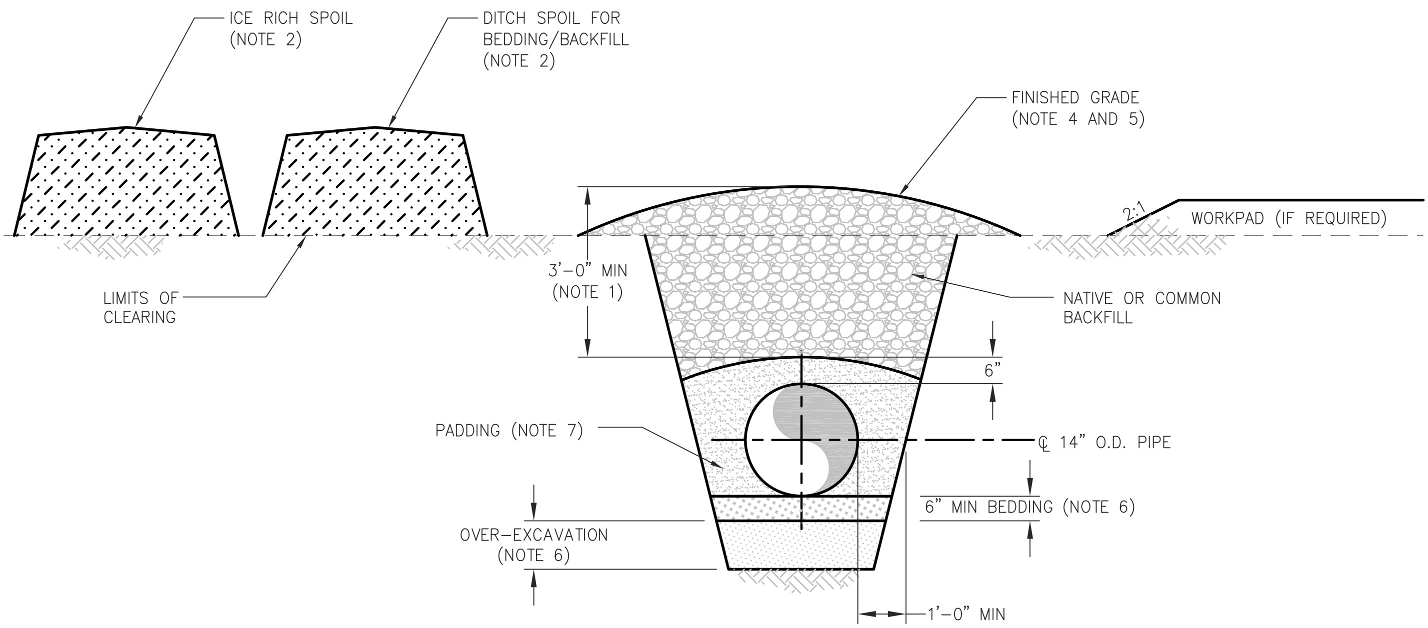
ADEC 2011. Alaska Storm Water Guide. Anchorage, Alaska: Alaska Dept. of Environmental Conservation, Division of Water. December.

ADEC 2013a. Alaska Department of Environmental Conservation. http://www.dec.state.ak.us/water/wqsar/. Site visited 8/29/2013.

ADEC 2013b. Alaska Department of Environmental Conservation Contaminated Sites. http://www.arcgis.com/home/item.html?id=315240bfbaf84aa0b8272ad1cef3cad3. Site visited 9/3/2013.

EPA 2007. Developing your Stormwater Pollution Prevention Plan: A Guide for Construction Sites. U.S. Environmental Protection Agency-833-R-06-004.

Attachment 1
Engineering Typicals



TYPICAL SECTION

NOT TO SCALE

NOTES:

1. MINIMUM DEPTH OF COVER: 36". ADDITIONAL COVER MAY BE REQUIRED FOR BUOYANCY CONTROL. RIVER AND STREAM SCOUR, AND BENDS.
2. EXCAVATION:
   LOG THE TRENCH MATERIAL AS IT IS DUG. SEGREGATE ICE RICH MATERIAL IN A SPOIL PILE SEPARATE FROM DITCH SPOIL WHICH IS ACCEPTABLE FOR BACKFILL. IN EXTREME CASES OF ICE CONTENT, IT MAY BE NECESSARY TO HAUL IN ADDITIONAL SELECT MATERIAL AND/OR TO HAUL THE ICE RICH SPOIL TO AN APPROVED DISPOSAL SITE, SUCH AS AN ABANDONED MATERIAL SITE, COULD BE CONSIDERED.
3. PRIOR TO FINAL DESIGN:
   GEOTECHNICAL LOGGING OF BORE HOLES TO DETERMINE ICE CONTENT IN THE DITCH PROFILE AND BELOW THE DITCH BOTTOM FOR AN ADDITIONAL 10' OR WHATEVER DEPTH WAS DETERMINED TO AFFECT PIPELINE SETTLEMENT IN THE EVENT OF THAWING BELOW THE PIPELINE.
4. PLACE AND ROACH THE REMAINING DITCH SPOIL. INCLUDING THE ICE RICH SPOIL, OVER TOP OF THE PADDING AND ALLOW IT TO THAW DURING SUMMER SEASON.
5. PLACE APPROPRIATE EROSION CONTROL DEVICES (ECDs) ALONG THE ROACH DITCH LINE WHERE ICE RICH SPOIL MIGHT FLOW INTO AN EXISTING DRAINAGE WHEN IT MELTS. SEED THE ROACHED SPOIL PILE AND ANY DISTURBED RIGHT OF WAY. INSPECT THE DITCH LINE IN THE SUMMER/FALL FOLLOWING WINTER CONSTRUCTION AND USE LOW GROUND PRESSURE EQUIPMENT TO DRESS UP OR RE–SHAPE THE ROACHED SPOIL OVER THE DITCH AS NEEDED. RE–SEED AND RE–PLACE ECDs IF NECESSARY. REPEAT INSPECTION ANNUALLY FOR THE FIRST THREE SEASONS OR AS NEEDED TO MAINTAIN SOIL STABILITY.
6. PLACEMENT OF SELECT, THAW STABLE FILL FOR PIPE BEDDING IN ANY OVER–EXCAVATED SECTIONS TO PROPERLY SUPPORT AND BED THE PIPE.
7. PLACEMENT OF SELECT, THAW STABLE PADDING AROUND THE PIPE TO 6" ABOVE THE PIPE. ACCEPTABLE DITCH SPOIL WOULD BE PREFERRED. IMPORTED MATERIAL MIGHT BE NEEDED IF DITCH SPOIL IS NOT ACCEPTABLE.
8. OVER–EXCAVATE 3 FEET BELOW TARGET DITCH DEPTH WHERE VISIBLE SEGREGATED ICE (FROZEN GROUND CLASSIFICATION Vx) IS DISCOVERED IN THE DITCH BOTTOM. BACKFILL OVER–EXCAVATION WITH THAW–STABLE BEDDING. PLACE GEOGRID, IF SO DIRECTED BY THE ENGINEER, TO SPAN AREAS OF OVER–EXCAVATION.

PRELIMINARY
NOT FOR CONSTRUCTION!

DONLIN GOLD PROJECT
APPLICANT: Donlin Gold, LLC.
4720 Business Park Blvd., Suite G–25
Anchorage, Alaska 99503

BURIED PIPE WITH OVER–EXCAVATION IN ICE RICH SOILS TYPICAL SECTION

OWNER:

DATE: OCTOBER 2013	P01C–SCIS–01	REV 1

MBaker P01C–SCIS–01 Mon, 14/Oct/13

BRIDGE DETAIL NOTES:

1. DESIGN AND MAINTAIN BRIDGE TO WITHSTAND AND PASS THE HIGHEST ANTICIPATED FLOW THAT MAY OCCUR WHILE THE BRIDGE IS IN PLACE. CULVERTS MUST BE ALIGNED TO PREVENT BANK EROSION OR STREAM BED SCOUR.
2. INSPECT BRIDGE ELEVATION SO BRIDGE REMAINS SUPPORTED ABOVE HIGH BANK, AND DOES NOT SINK INTO BANK. ADDITIONAL SUPPORT MUST BE ADDED ON TOP OF BANK AND UNDER SPAN IF INITIAL SUPPORT STARTS TO SETTLE. ALL BRIDGES MUST BE ANCHORED FOR STABILITY.
3. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED AND MAINTAINED. CONSTRUCT SEDIMENT BARRIERS ACROSS THE ENTIRE CONSTRUCTION R.O.W. TO PREVENT SILT LADEN WATER AND SPOIL FROM FLOWING BACK INTO WATERBODY. SILT FENCE OR SANDBAGS MAY BE USED INTERCHANGEABLY.
4. BRIDGE DECKS WILL BE KEPT FREE OF SOIL.
5. EQUIPMENT BRIDGES WILL CONSIST OF ONE OF THE FOLLOWING: CLEAN ROCK PLACED OVER FLUME PIPES; PREFABRICATED CONSTRUCTION MATS; OR FLEX-FLOAT OR OTHER TEMPORARY BRIDGING, SUCH AS BAILEY BRIDGES.
6. REMOVE EQUIPMENT BRIDGES AND ASSOCIATED MATERIAL AS SOON AS POSSIBLE. RESTORE AND STABILIZE BED AND BANKS TO APPROXIMATE PRE-CONSTRUCTION CONDITIONS.
7. DISPOSE OF ANY ROCK AS DIRECTED.

DONLIN GOLD PROJECT

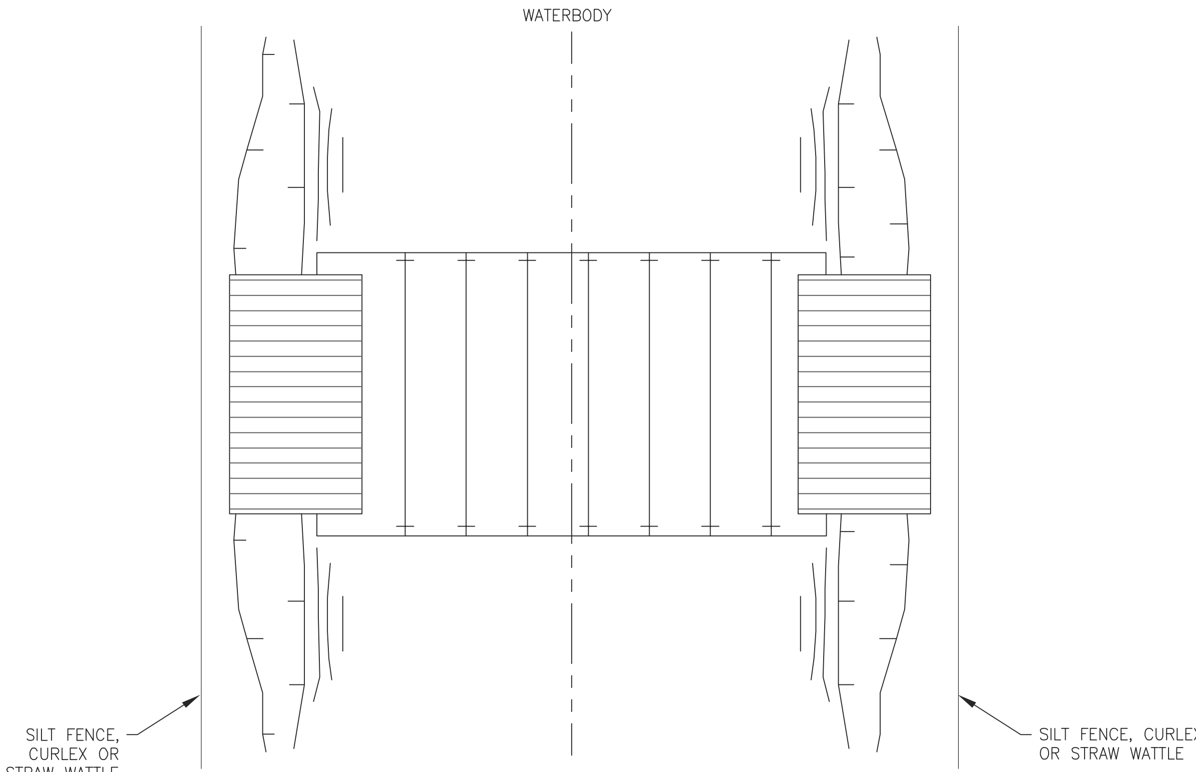
APPLICANT: Donlin Gold, LLC.
4720 Business Park Blvd., Suite G-25
Anchorage, Alaska 99503

**TYPICAL
BRIDGE DETAIL NOTES**

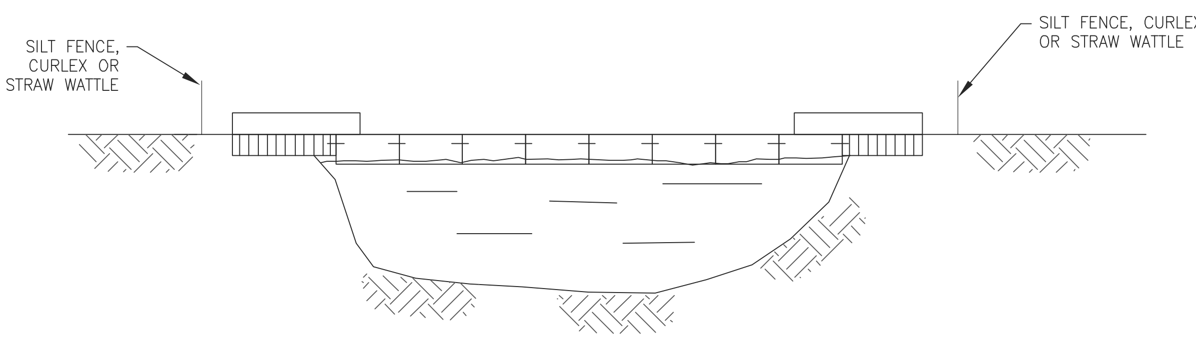
OWNER:

DATE: OCTOBER 2013	P01C-TYBD-01	REV 1

MBaker P01C-TYBD-01 Wed, 16/Oct/13



PLAN VIEW
NOT TO SCALE



SECTION VIEW
NOT TO SCALE

DONLIN GOLD PROJECT
APPLICANT: Donlin Gold, LLC.
4720 Business Park Blvd., Suite G-25
Anchorage, Alaska 99503

TYPICAL FLEX-FLOAT BRIDGE

OWNER:

DATE: OCTOBER 2013	P01C-TYBD-02	REV 1

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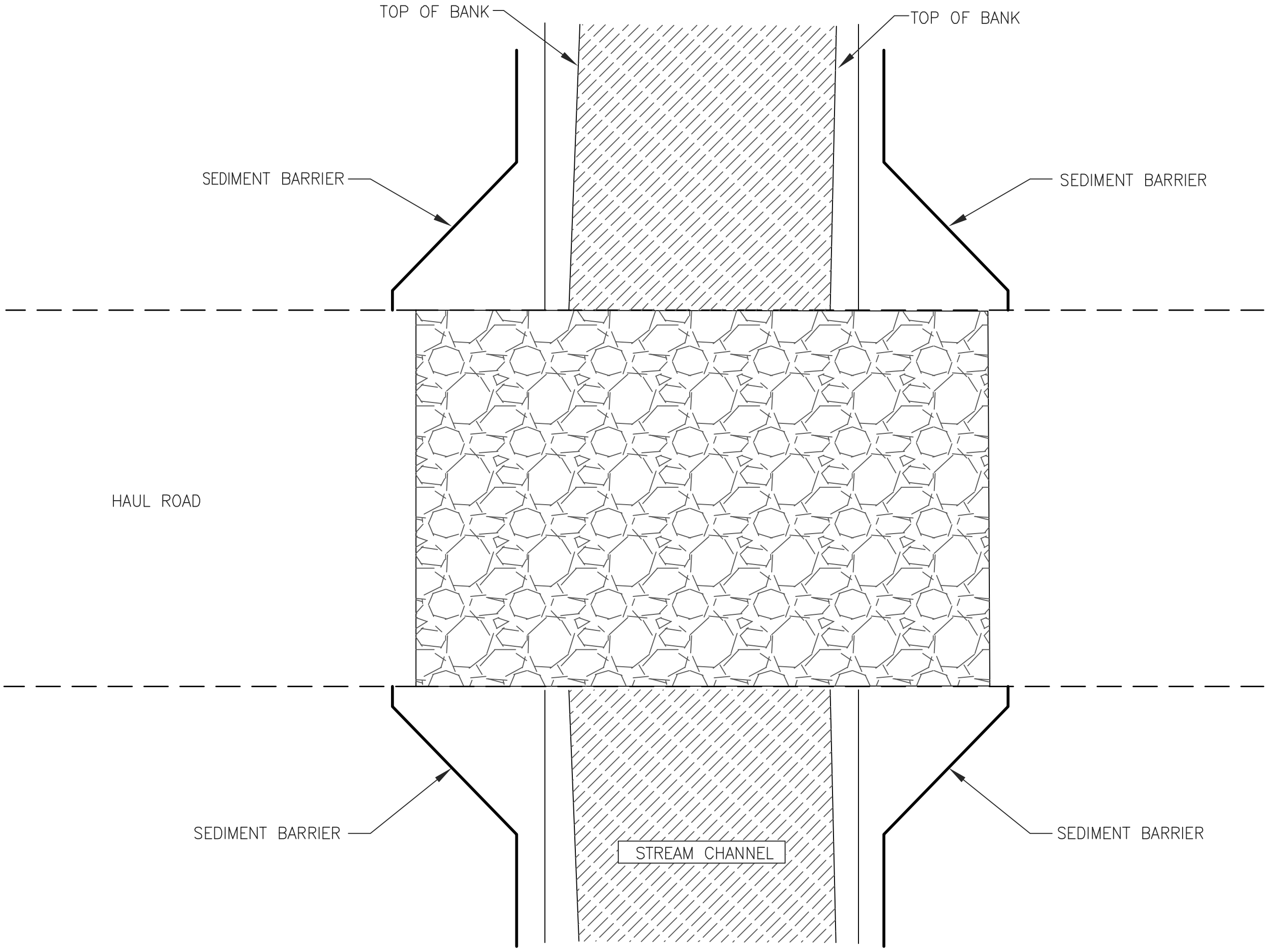
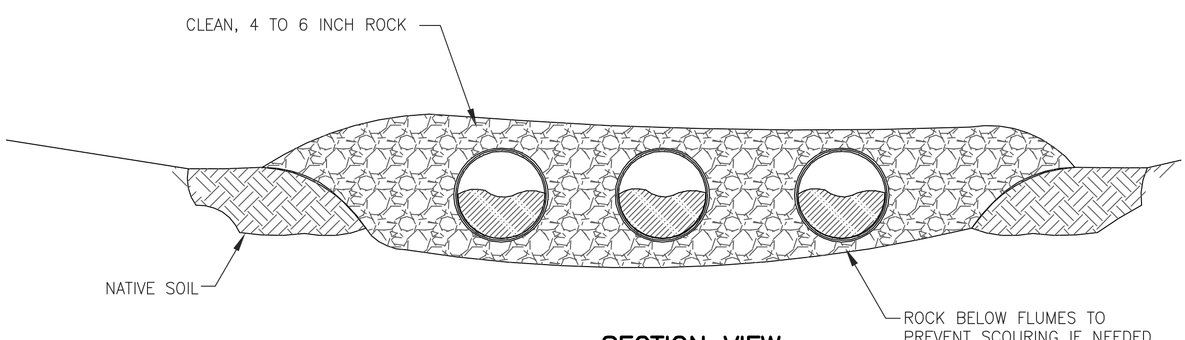


PLAN VIEW
NOT TO SCALE



SECTION VIEW
NOT TO SCALE

DONLIN GOLD PROJECT
APPLICANT: Donlin Gold, LLC.
4720 Business Park Blvd., Suite G-25
Anchorage, Alaska 99503

TYPICAL
ROCK FLUME BRIDGE

OWNER:

DATE: OCTOBER 2013	P01C-TYBD-03	REV 1

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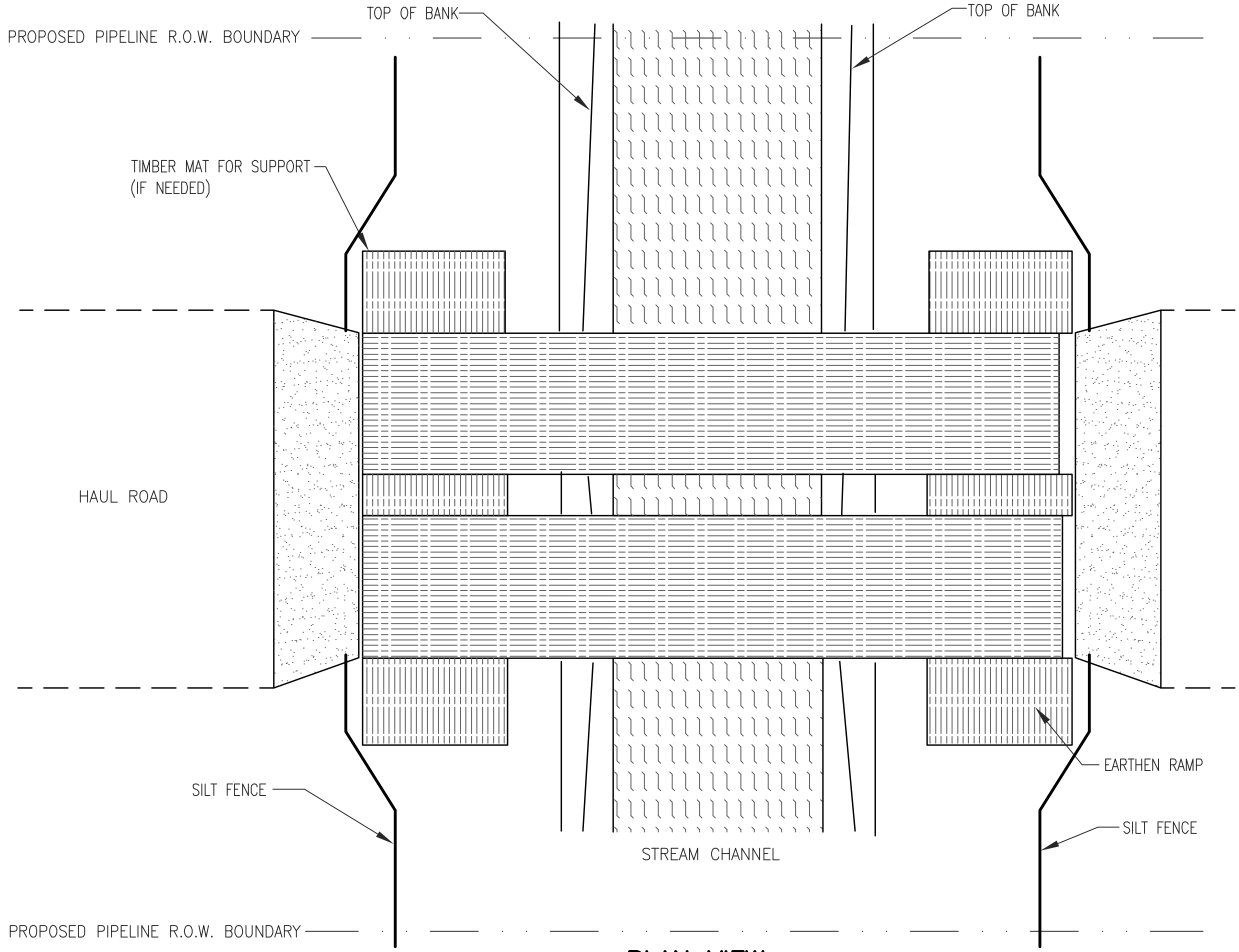
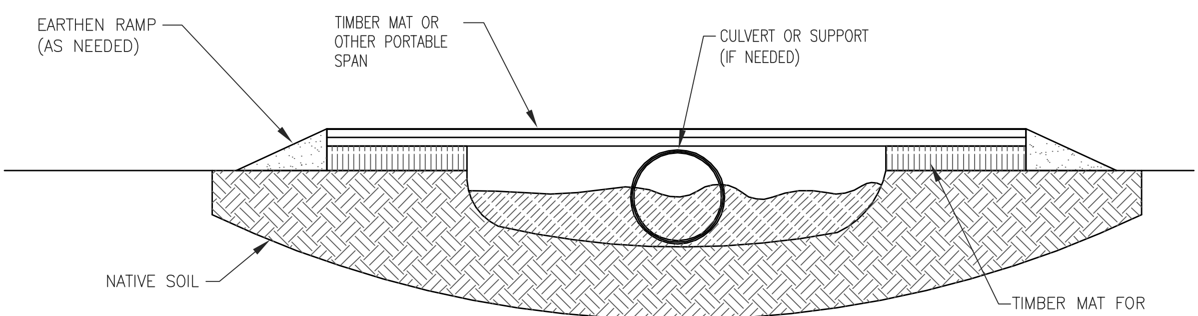


PLAN VIEW
NOT TO SCALE



SECTION VIEW
NOT TO SCALE

DONLIN GOLD PROJECT
APPLICANT: Donlin Gold, LLC.
4720 Business Park Blvd., Suite G-25
Anchorage, Alaska 99503

TYPICAL
TIMBER MAT BRIDGE

OWNER:

DATE: OCTOBER 2013	P01C-TYBD-04	REV 1

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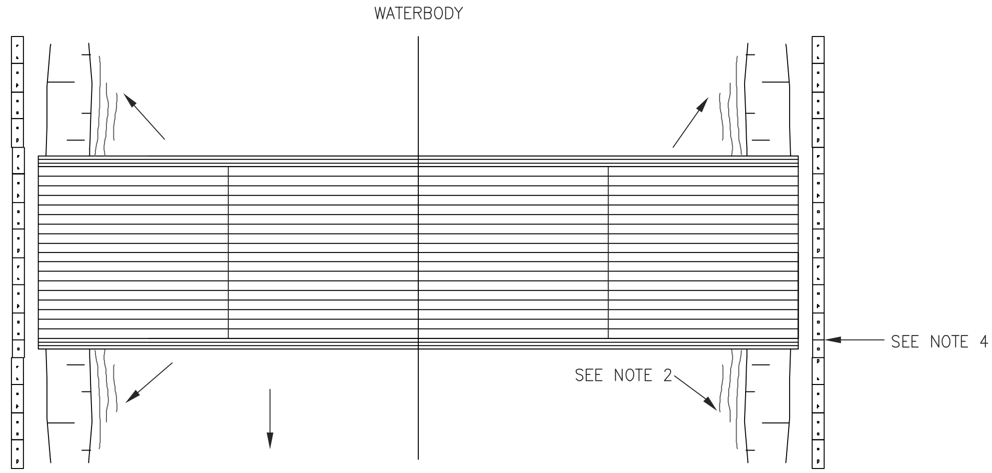
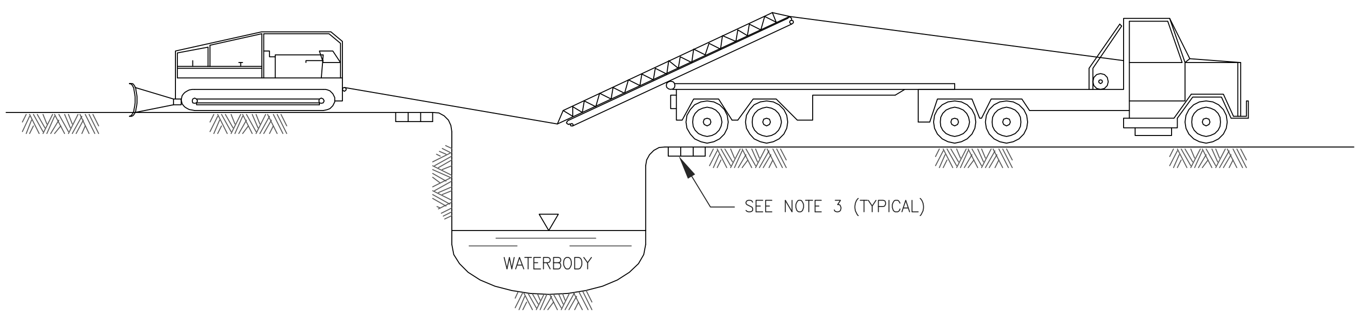


PLAN

NOT TO SCALE



PROFILE

NOT TO SCALE

NOTES:

1. THIS TYPE OF BRIDGE IS GENERALLY USED ON NARROW, DEEP CROSSINGS.
2. BRIDGE IS ANCHORED AND/OR TIED OFF TO ANCHOR BLOCKS FOR STABILITY.
3. UTILIZE APPROACH FILLS OF CLEAN GRANULAR MATERIAL, SWAMP MATS, SKIDS OR OTHER SUITABLE MATERIALS TO AVOID CUTTING THE BANKS WHEREVER FEASIBLE. ENSURE ADEQUATE FREEBOARD. AS REQUIRED, ENSURE THAT FILL MATERIAL USED DOES NOT SPILL INTO WATERBODY.
4. CONSTRUCT SEDIMENT BARRIERS ACROSS THE ENTIRE CONSTRUCTION R.O.W. TO PREVENT SILT LADEN WATER AND SPOIL FROM FLOWING BACK INTO WATERBODY. BARRIERS MAY BE TEMPORARILY REMOVED TO ALLOW CONSTRUCTION ACTIVITIES.
5. RESTORE AND STABILIZE BED AND BANKS TO APPROXIMATE PRE–CONSTRUCTION CONDITIONS.

DONLIN GOLD PROJECT

APPLICANT: Donlin Gold, LLC.

4720 Business Park Blvd., Suite G–25
Anchorage, Alaska 99503

TYPICAL
PORTABLE WATERBODY BRIDGE

OWNER:

DATE:	OCTOBER 2013	P01C–TYBD–05	REV 1

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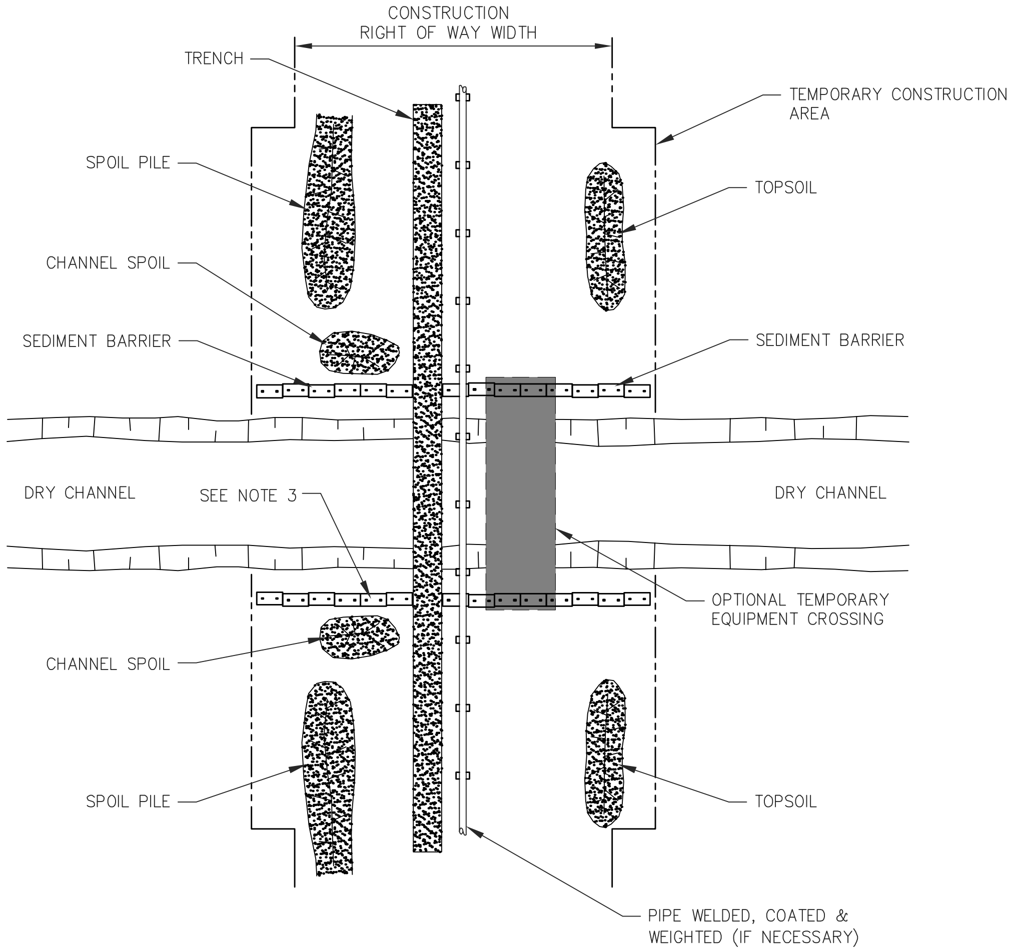


PLAN VIEW

NOT TO SCALE

NOTES:

1. METHOD APPLIES TO CROSSING WHERE NO FLOWING WATER IS PRESENT AT THE TIME OF CROSSING.
2. CONTRACTOR MAY "MAINLINE THROUGH" THE CROSSING OR UP TO BOTH SIDES OF THE CROSSING; STRING, WELD, COAT, AND WEIGHT (IF NECESSARY), USING THE MAINLINE CREW WITH THE PIPE SKIDDED OVER THE CROSSING.
3. CONSTRUCT SEDIMENT BARRIERS ACROSS THE ENTIRE CONSTRUCTION R.O.W. FOLLOWING CLEARING AND GRADING AND MAINTAIN UNTIL CONSTRUCTION OF THE CROSSING. EROSION CONTROL MEASURES SHALL BE REINSTALLED IMMEDIATELY FOLLOWING BACKFILLING OF TRENCH AND STABILIZATION OF BANKS.
4. TOPSOIL AND SPOIL WILL NOT BE STOCKPILED IN THE CROSSING CHANNEL.
5. MAINTAIN STREAM FLOW THROUGHOUT CROSSING CONSTRUCTION.
6. BACKFILL WITH NATIVE MATERIAL.
7. RESTORE CROSSING CHANNEL TO APPROXIMATE PRE-CONSTRUCTION PROFILE AND SUBSTRATE.
8. RESTORE CROSSING BANKS TO APPROXIMATE ORIGINAL CONDITION AND STABILIZE, AS REQUIRED.

DONLIN GOLD PROJECT

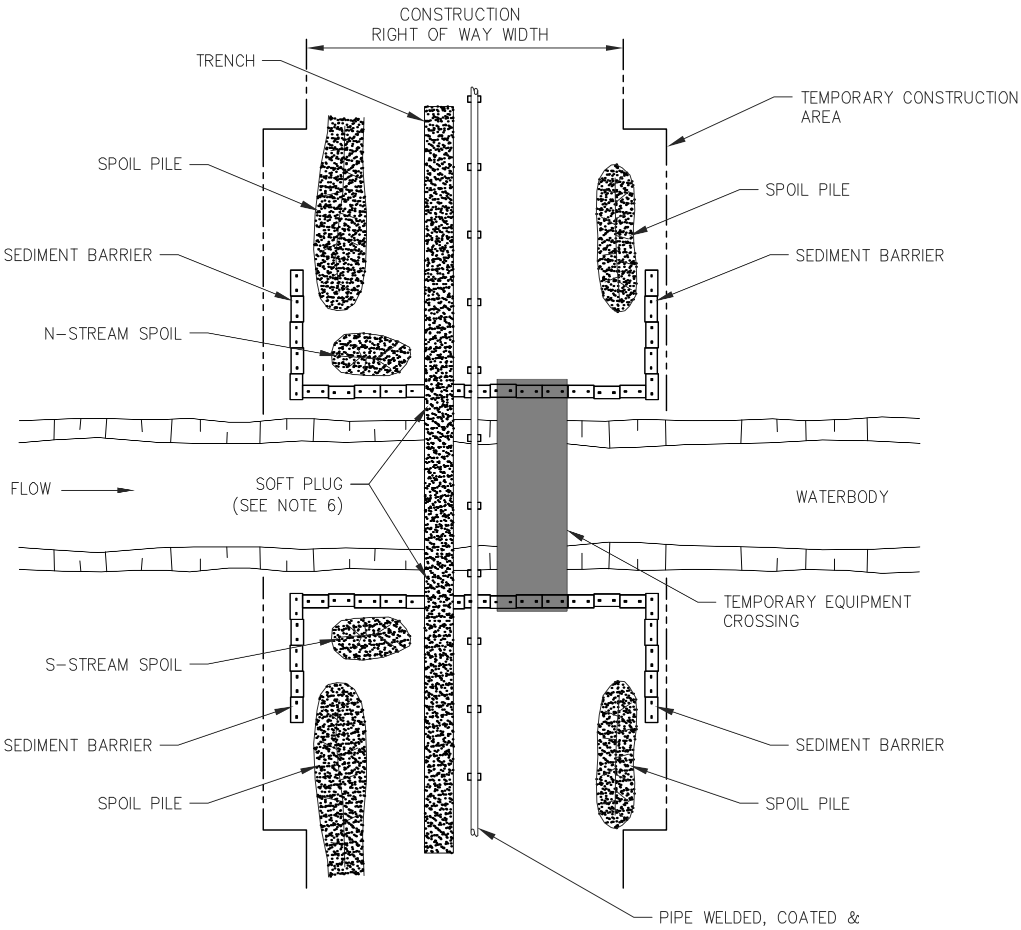
APPLICANT: Donlin Gold, LLC.
4720 Business Park Blvd., Suite G-25
Anchorage, Alaska 99503

TYPICAL
NON-FLOWING WATERBODY CROSSING OPEN-CUT

OWNER:

DATE: OCTOBER 2013	P01C-TYWC-01	REV 1

MBaker P01C-TYWC-01 Wed, 16/Oct/13



PLAN VIEW
NOT TO SCALE

NOTES:

1. SCHEDULE CROSSING DURING LOW FLOW PERIOD IF POSSIBLE.
2. COMPLETE ALL IN-STREAM ACTIVITIES WITHIN 24 HOURS IF FEASIBLE.
3. NO REFUELING OF MOBILE EQUIPMENT WITHIN 200 FEET OF WATERBODY. REFUEL STATIONARY EQUIPMENT AS PER THE HAZARDOUS MATERIALS MANAGEMENT AND SPCCC PLAN.
4. CONSTRUCT SEDIMENT BARRIERS ALONG THE SIDES OF STOCKPILES AND ACROSS THE ENTIRE CONSTRUCTION R.O.W. TO PREVENT SILT LADEN WATER AND SPOIL FROM FLOWING BACK INTO WATERBODY. BARRIERS MAY BE TEMPORARILY REMOVED TO ALLOW CONSTRUCTION ACTIVITIES BUT MUST BE REPLACED BY THE END OF EACH WORK DAY.
5. IN-STREAM SPOIL TO BE STORED OUT OF THE STREAM CHANNEL AND WITHIN THE CONSTRUCTION R.O.W.
6. INSTALL SOFT PLUGS AT THE EDGE OF STREAM BANKS UNTIL JUST PRIOR TO PIPE INSTALLATION TO CONTROL WATER FLOW & TRENCH SLOUGHING, IF NEEDED.
7. MAINTAIN STREAM FLOW THROUGHOUT CROSSING CONSTRUCTION.
8. BACKFILL WITH NATIVE MATERIAL.
9. RESTORE WATERBODY CHANNEL TO APPROXIMATE PRE-CONSTRUCTION PROFILE AND SUBSTRATE.
10. RESTORE STREAM BANKS TO APPROXIMATE ORIGINAL CONDITION AND STABILIZE, AS REQUIRED.
11. ALL DIMENSIONS INDICATED SHALL BE DETERMINED BY ACTUAL CONSTRUCTION CONDITIONS.
12. FOLLOW REQUIREMENTS FROM THE ARMY CORPS OF ENGINEERS.
13. DRAWING DEPICTED IS SUPERSEDED BY WRITTEN STANDARD, SCOPE OF WORK OR LINE LIST.

DONLIN GOLD PROJECT APPLICANT: Donlin Gold, LLC. 4720 Business Park Blvd., Suite G-25 Anchorage, Alaska 99503
TYPICAL FLOWING WATERBODY CROSSING OPEN-CUT
OWNER:
DATE: OCTOBER 2013   P01C-TYWC-02   REV 1

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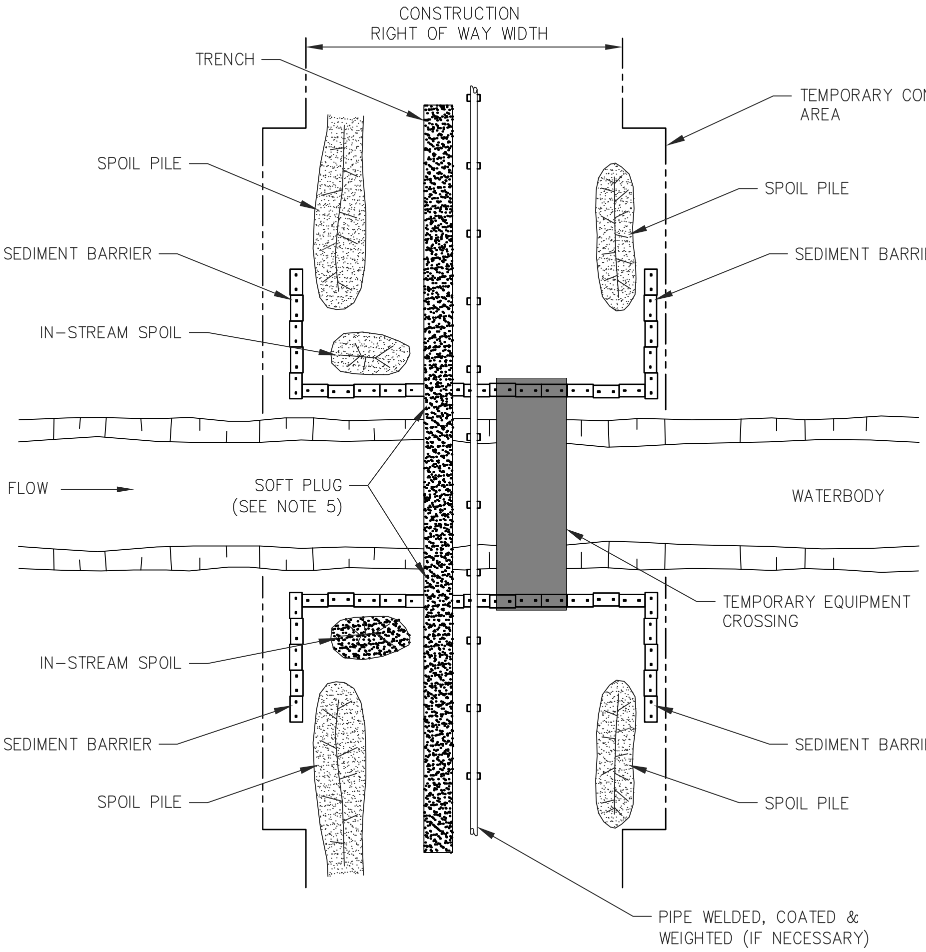

PLAN VIEW

NOT TO SCALE

NOTES:

1. METHOD APPLIES TO WATERBODIES THAT ARE NOT STATE DESIGNATED FISHERIES WHERE FLUME CROSSINGS ARE NOT REQUIRED. IF TOPOGRAPHY PERMITS TEMPORARY EQUIPMENT BRIDGE INSTALLATION, THE CONTRACTOR SHALL TRENCH, STRING, WELD, COAT, WEIGHT (IF NECESSARY). LOWER IN AND BACKFILL UTILIZING THE MAIN LINE CREW TRAVELING OVER THE BRIDGE. IF TOPOGRAPHY PROHIBITS INSTALLATION OF A TEMPORARY EQUIPMENT BRIDGE, CONTRACTOR SHALL TRENCH UP TO BOTH SIDES OF CROSSING; STRING, WELD, COAT AND WEIGHT (IF NECESSARY) USING THE MAINLINE CREW. IN STREAM EXCAVATION, LOWER IN, AND BACKFILL WILL UTILIZE A CLAM OR HOES WORKING FROM THE BANKS.
2. SCHEDULE CROSSING DURING LOW FLOW PERIOD IF POSSIBLE.
3. CONSTRUCT SEDIMENT BARRIERS ALONG THE SIDES OF STOCKPILES AND ACROSS THE ENTIRE CONSTRUCTION R.O.W. TO PREVENT SILT LADEN WATER AND SPOIL FROM FLOWING BACK INTO WATERBODY.
4. IN–STREAM SPOIL TO BE STORED OUT OF THE STREAM CHANNEL.
5. INSTALL TEMPORARY (SOFT) PLUGS AT THE EDGE OF STREAM BANKS UNTIL JUST PRIOR TO PIPE INSTALLATION TO CONTROL WATER FLOW & TRENCH SLOUGHING.
6. TRENCH THROUGH WATERBODY USING MAINLINE EXCAVATION EQUIPMENT WHERE PRACTICAL.
7. MAINTAIN STREAM FLOW THROUGHOUT CROSSING CONSTRUCTION.
8. RESTORE WATERBODY CHANNEL TO APPROXIMATE PRE–CONSTRUCTION PROFILE AND SUBSTRATE.
9. RESTORE STREAM BANKS TO APPROPRIATE ORIGINAL CONDITION AND STABILIZE, AS REQUIRED.

DONLIN GOLD PROJECT APPLICANT: Donlin Gold, LLC. 4720 Business Park Blvd., Suite G–25 Anchorage, Alaska 99503	
TYPICAL FLOWING WATERBODY CROSSING OPEN–CUT	
OWNER:	
DATE: OCTOBER 2013	P01C–TYWC–03 REV 1

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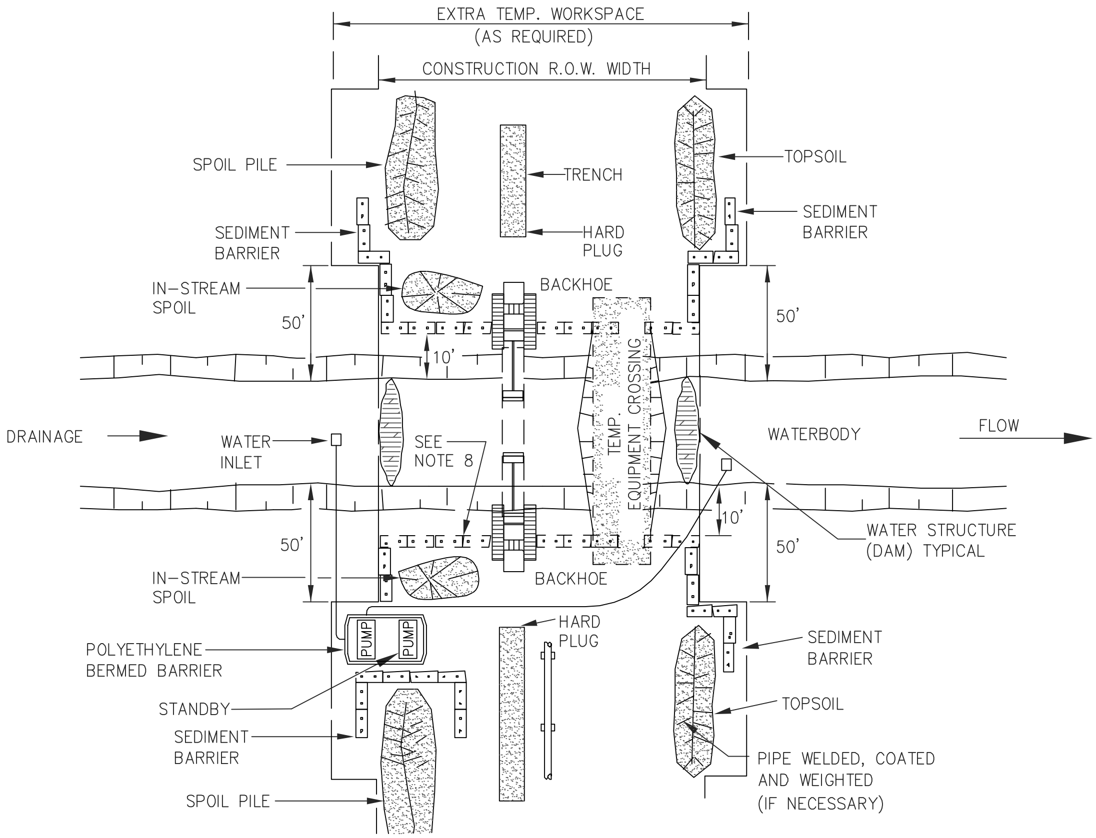

PLAN VIEW

NOT TO SCALE

NOTES:

1. THIS METHOD APPLIES TO SWALES, DRAINS, SMALL STREAMS OR CREEKS WITH LIMITED FLOW AT TIME OF CONSTRUCTION WHERE DOWNSTREAM SILTATION MUST BE AVOIDED AND THE CROSSING WIDTH IS NOT PROHIBITIVE.
2. SCHEDULE CROSSING DURING LOW FLOW PERIOD IF POSSIBLE.
3. COMPLETE ALL IN-STREAM ACTIVITIES AS EXPEDIENTLY AS POSSIBLE.
4. INSTALL TEMPORARY VEHICLE CROSSING, IF REQUIRED.
5. IN-STREAM SPOIL TO BE STORED OUT OF THE STREAM CHANNEL AND WITHIN THE CONSTRUCTION R.O.W. UNLESS DEPICTED OTHERWISE IN THE SITE SPECIFIC CROSSING PLANS.
6. CONSTRUCT SEDIMENT BARRIERS TO PREVENT SILT LADEN WATER AND SPOIL FROM FLOWING INTO WATERBODY. CONSTRUCTED SEDIMENT BARRIERS SHALL EXTEND ALONG THE SIDES OF THE SPOIL AND TOPSOIL STOCKPILES AND ACROSS THE ENTIRE CONSTRUCTION R.O.W. BARRIERS MAY BE TEMPORARILY REMOVED TO ALLOW CONSTRUCTION ACTIVITIES BUT MUST BE REPLACED BY THE END OF EACH WORK DAY.
7. CONSTRUCT UPSTREAM STRUCTURE (DAM) FOLLOWED BY DOWNSTREAM STRUCTURE (DAM). WATER STRUCTURES' (AQUA DAM, JERSEY BARRIERS, SAND BAGS, STEEL PLATE, POLYETHYLENE LINER, ETC.) FINAL LOCATION WILL BE APPROVED BY THE COMPANY INSPECTOR.
8. SIZE PUMPS FOR DIVERSION OF ENTIRE STREAM FLOW. CONTRACTOR SHALL MAINTAIN 100% SPARE PUMPING CAPACITY ON SITE. PUMPS SHALL BE INSTALLED ON POLYETHYLENE BARRIERS FOR FUEL/OIL SPILL CONTAINMENT. PUMP INTAKES WILL BE SCREENED TO PREVENT ENTRAPMENT OF FISH. CONTRACTOR SHALL MONITOR PUMPS AND WATER STRUCTURES ON A 24 HOUR BASIS UNTIL THE CROSSING INSTALLATION IS COMPLETE. SHOULD LEAKAGE AT THE DAM STRUCTURES OCCUR, CONTRACTOR SHALL DEWATER BETWEEN THE STRUCTURES THROUGH AN APPROPRIATE FILTER AND ONTO A WELL VEGETATED UPLAND AREA.
9. LEAVE HARD PLUGS AT STREAM BANK EDGE UNTIL JUST PRIOR TO PIPE INSTALLATION.
10. COMPLETE CONSTRUCTION OF IN-STREAM PIPE SECTION. WEIGHT PIPE AS NECESSARY PRIOR TO COMMENCEMENT OF IN-STREAM ACTIVITY.
11. TRENCH THROUGH WATERBODY AS EXPEDIENTLY AS PRACTICAL. INSTALL TEMPORARY (SOFT) PLUGS, IF NECESSARY, TO CONTROL WATER FLOW AND TRENCH SLOUGHING.
12. MAINTAIN STREAM FLOW THROUGHOUT CROSSING CONSTRUCTION.
13. LOWER-IN PIPE, INSTALL TRENCH PLUG AND BACKFILL IMMEDIATELY.
14. RESTORE WATERBODY CHANNEL TO APPROXIMATE PRE-CONSTRUCTION PROFILE AND SUBSTRATE.
15. DISMANTLE DOWNSTREAM WATER STRUCTURE (DAM) AND UPSTREAM WATER STRUCTURE (DAM) AFTER TRENCH BACKFILL.
16. RESTORE STREAM BANKS TO APPROXIMATE ORIGINAL CONDITION. STABILIZE WATERBODY BANKS AND INSTALL TEMPORARY BARRIERS.

DONLIN GOLD PROJECT APPLICANT: Donlin Gold, LLC. 4720 Business Park Blvd., Suite G-25 Anchorage, Alaska 99503		
TYPICAL **WATERBODY CROSSING OPEN-CUT DAM & PUMP**		
OWNER:		
DATE: OCTOBER 2013	P01C-TYWC-04	REV 1

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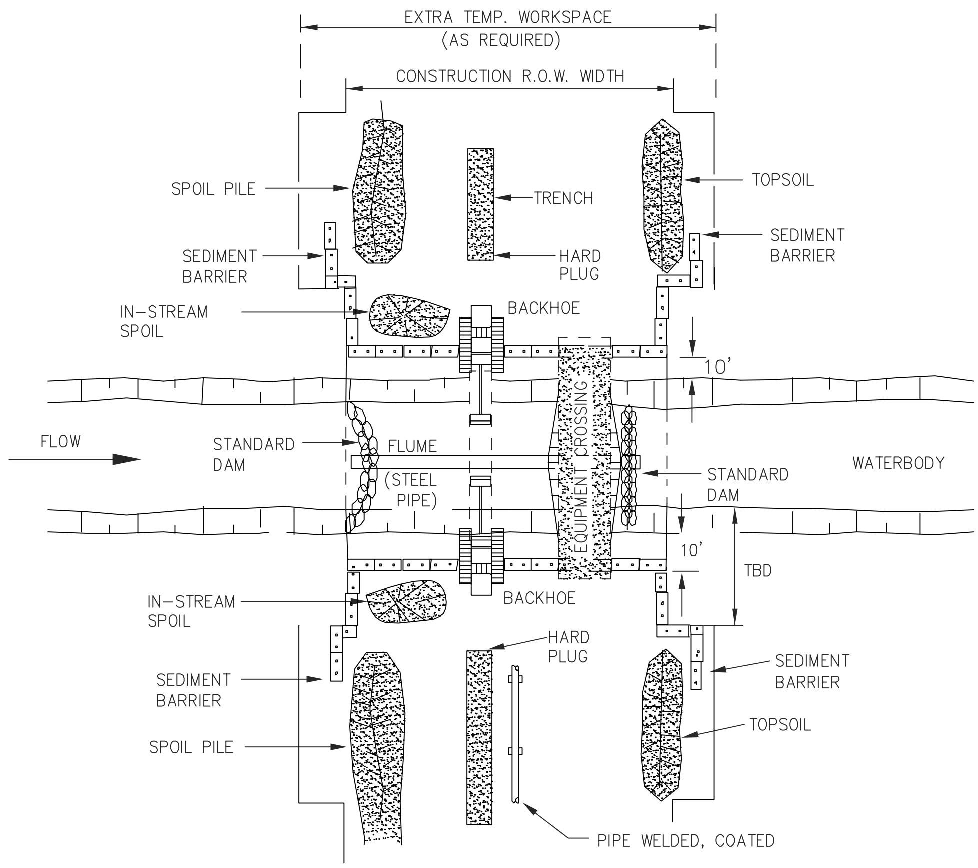

DONLIN GOLD PROJECT

APPLICANT: Donlin Gold, LLC.

4720 Business Park Blvd., Suite G-25
Anchorage, Alaska 99503

TYPICAL
WATERBODY CROSSING OPEN-CUT
DRY FLUME

OWNER:

DATE: OCTOBER 2013	P01C-TYWC-05	REV 1

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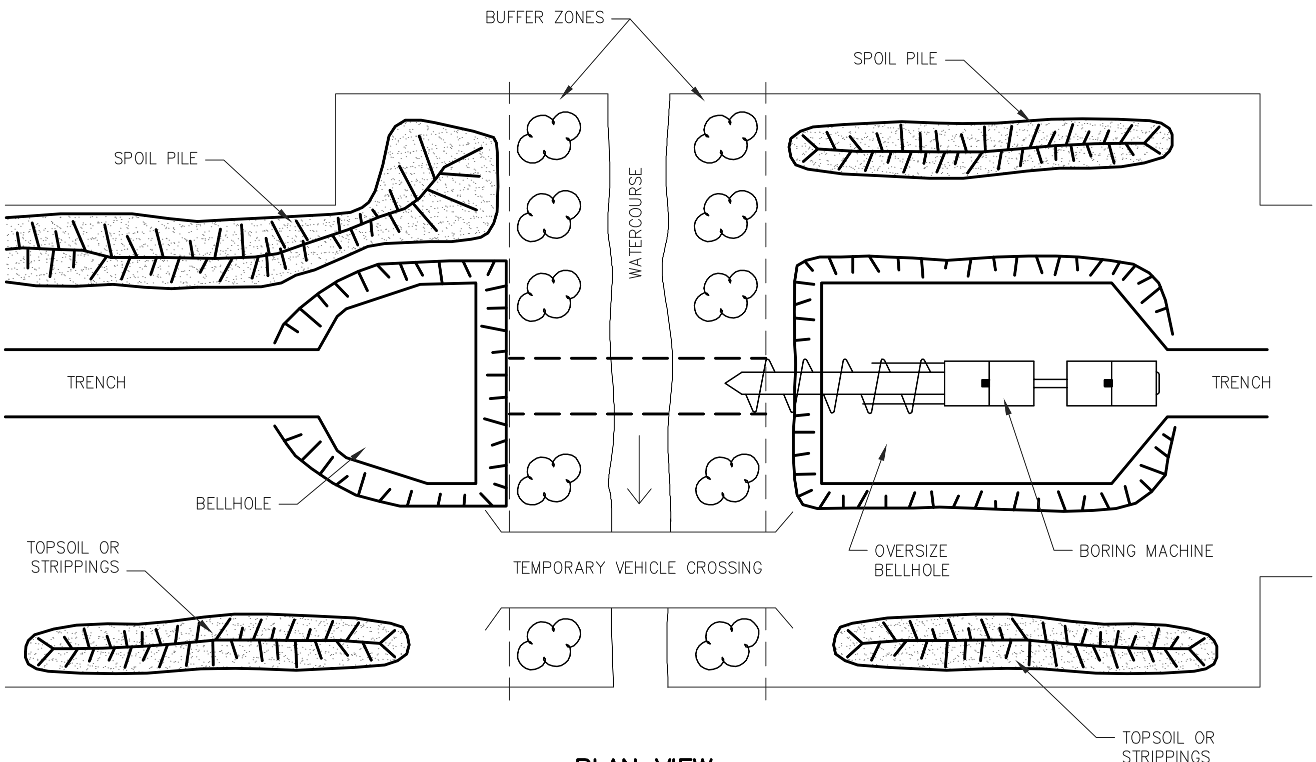
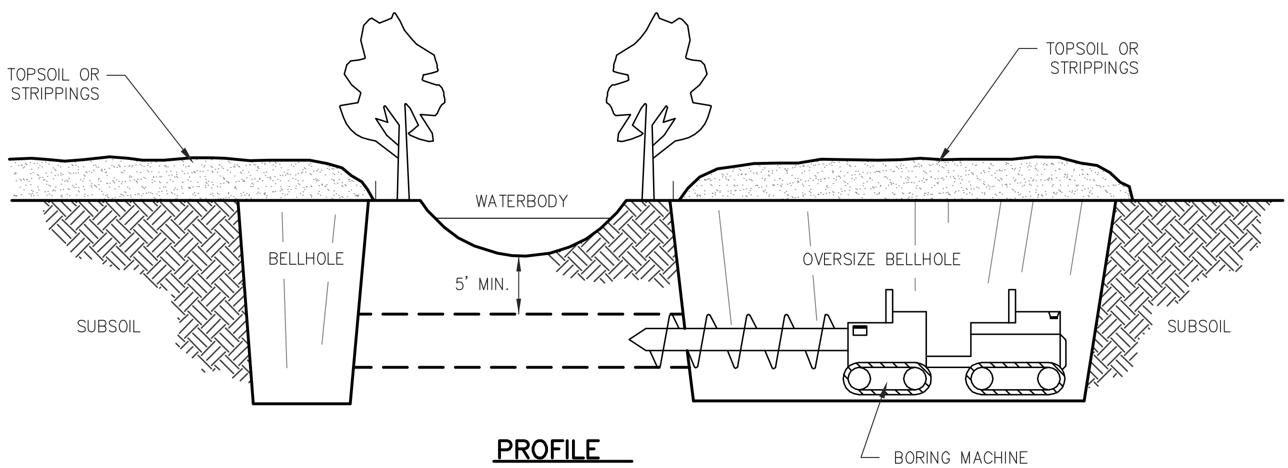


PLAN VIEW
NOT TO SCALE



PROFILE
NOT TO SCALE

DONLIN GOLD PROJECT

APPLICANT: Donlin Gold, LLC.
4720 Business Park Blvd., Suite G-25
Anchorage, Alaska 99503

TYPICAL
WATERBODY CROSSING HORIZONTAL BORE

OWNER:

DATE: OCTOBER 2013	P01C-TYWC-06	REV 1

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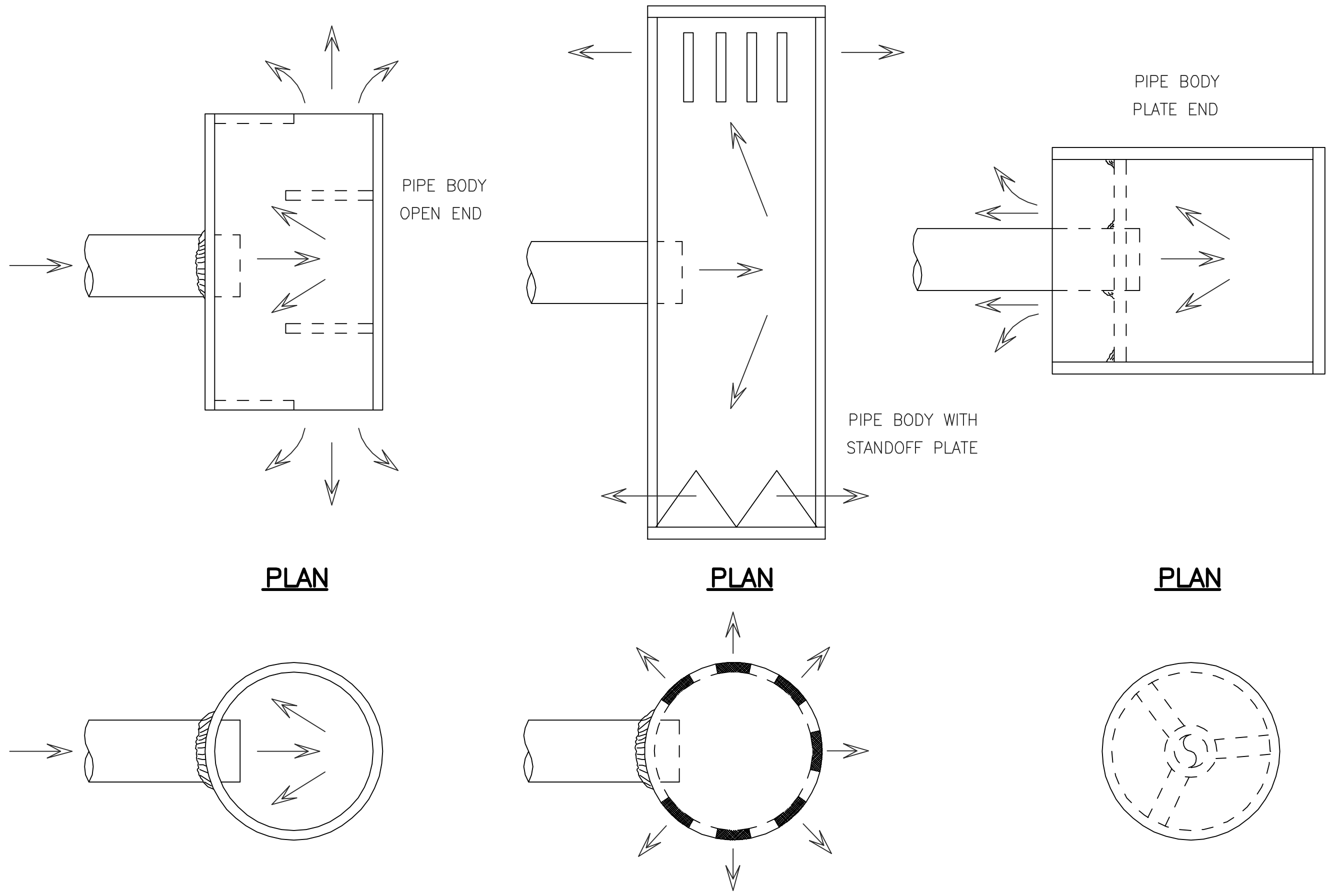

PROFILE | PROFILE | END VIEW

BASIC SPLASH PUP | **BASIC SPLASH PLATE** | **PLATE COMBINATION**

NOTES:

1. AN ENERGY DISSIPATOR SHALL BE UTILIZED WHENEVER WATER DISCHARGE VELOCITIES MAY CAUSE EROSION.
2. THE DESIGN AND EFFECTIVENESS OF THE ENERGY DISSIPATOR IS THE RESPONSIBILITY OF THE CONSTRUCTION CONTRACTOR.
3. ENERGY DISSIPATORS ARE UTILIZED IN CONJUNCTION WITH A DEWATERING STRUCTURE.
4. GEOTEX FABRIC OR EQUIVALENT SHALL BE PLACED UNDERNEATH AND AROUND DISSIPATOR DEVICE TO MINIMIZE EROSION.

DONLIN GOLD PROJECT
APPLICANT: Donlin Gold, LLC.
4720 Business Park Blvd., Suite G-25
Anchorage, Alaska 99503

TYPICAL
SPLASH PUP FOR TEST WATER DISCHARGE

OWNER:

DATE: OCTOBER 2013 | P01W-TYEC-01 | REV 1

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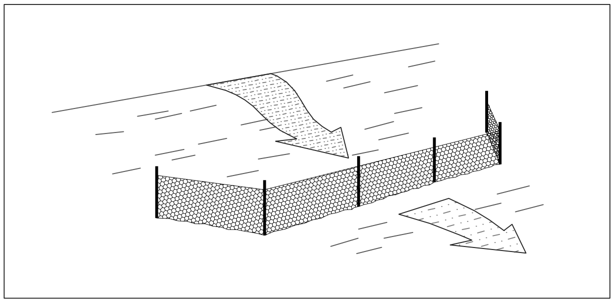
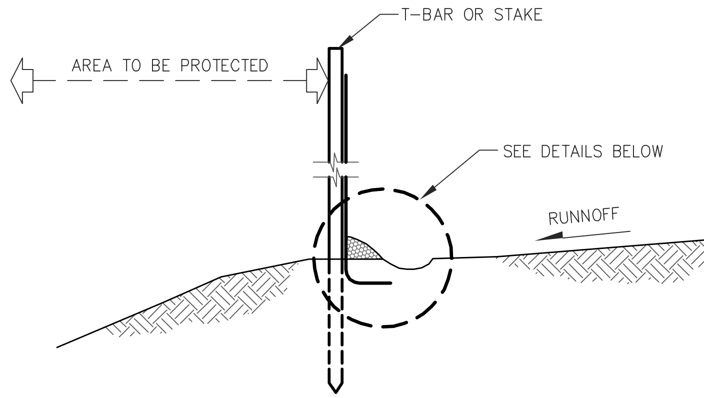
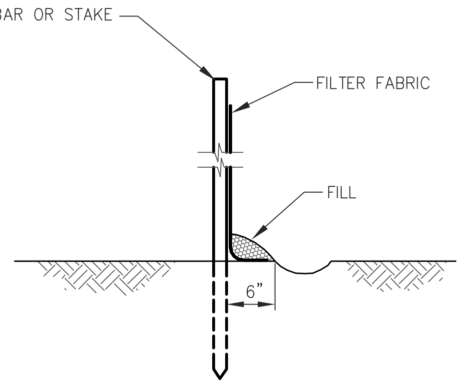
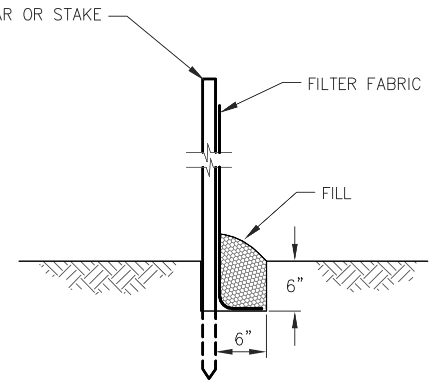




SIDE VIEW OF SILT FENCE



WITHOUT TRENCH ROCKY AREAS ONLY



WITH TRENCH

NOTES:

1. SILT FENCE COULD BE UTILIZED AT:
   * THE BASE OF ALL SLOPES ABOVE WETLANDS AND WATERBODIES
   * THE DOWNSLOPE RIGHT-OF-WAY EDGE WHERE ANY OF THE ABOVE-MENTIONED LOCATIONS ARE ADJACENT TO THE RIGHT-OF-WAY.
   * BETWEEN TOPSOIL/SPOIL STOCKPILES AND WATERBODIES OR WETLANDS AS NEEDED.
   * ALONG R.O.W. BOUNDARIES IN WETLAND CONSTRUCTION, AS NEEDED.
   * AS DIRECTED BY THE COMPANY'S REPRESENTATIVE.
2. THE SILT FENCE SHALL BE CONSTRUCRED AS FOLLOWS:
   * FABRIC USED FOR THE SILT FENCE SHALL BE A "STANDARD STRENGTH" GEOTEXTILE.
   * THE HEIGHT OF THE FENCE SHALL BE DONE AT POSTS AND OVERLAP WITH BOTH ENDS SECURED TO THE POST.
3. THE SILT FENCE SHALL BE INSTALLED AS SPECIFIED BY THE MANUFACTURER OR AS FOLLOWS:
   * A TRENCH, 6" WIDE AND 6" DEEP, SHALL BE EXCAVATED ALONG THE CONTOUR. THE POST SHALL BE DRIVEN INTO THE BOTTOM OF THE TRENCH ON THE DOWNSTREAM SIDE OF THE FILTER FABRIC. THE TRENCH SHALL BE BACK FILLED AND COMPACTED, ENSURING 6" OF FENCE IS BURIED WITHIN THE TRENCH.
   * IN AREAS WHERE THE TERRAIN IS TOO ROCKY FOR TRENCHING, A 6" GROUND FLAP WITH ROCK FILL TO HOLD IT IN PLACE SHALL BE USED.

DONLIN GOLD PROJECT APPLICANT: Donlin Gold, LLC. 4720 Business Park Blvd., Suite G-25 Anchorage, Alaska 99503		
TYPICAL SILT FENCE SEDIMENT BARRIER		
OWNER:		
DATE: OCTOBER 2013	P01W-TYEC-02	REV 1

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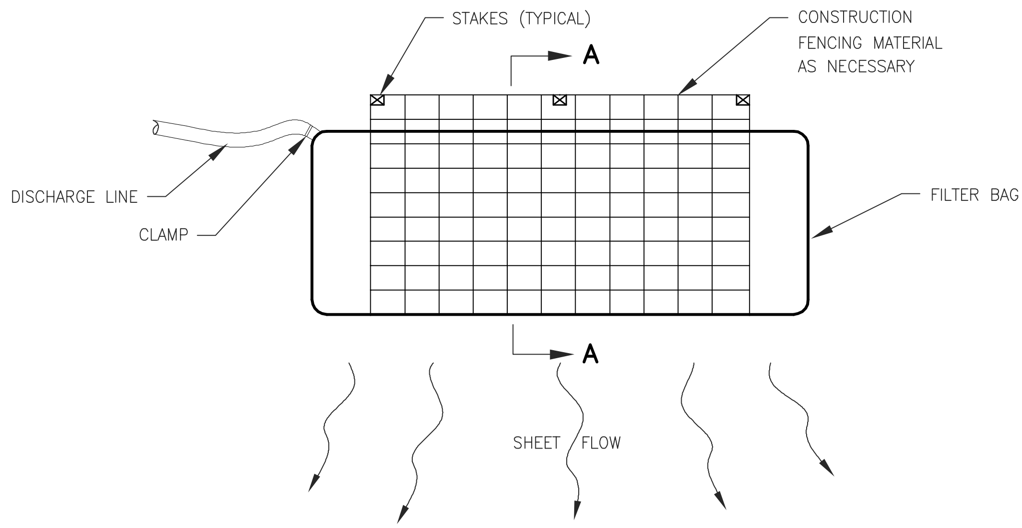
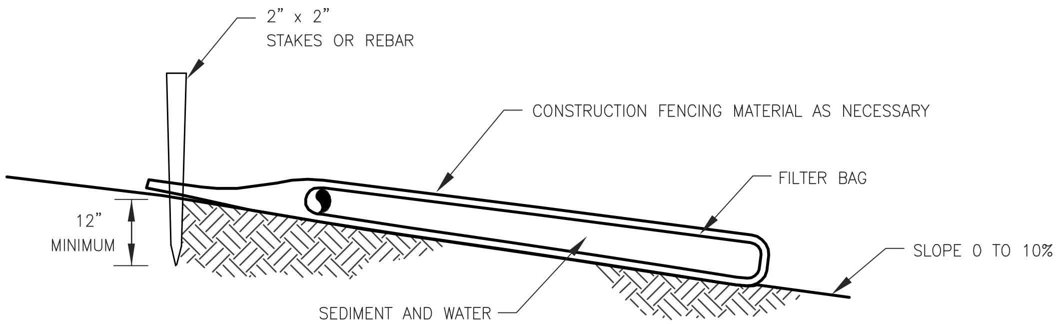


PLAN VIEW



SECTION A–A

NOTES:

1. INSTALL A DEWATERING GEOTEXTILE FILTER BAG AS DIRECTED BY THE COMPANY TO PREVENT THE FLOW OF HEAVILY SILT LADEN WATER INTO WATERBODIES OR WETLANDS.
2. DISCHARGE SITE SHALL BE WELL VEGETATED AND THE TOPOGRAPHY OF THE SITE SUCH THAT WATER WILL FLOW AWAY FROM ANY WORK AREAS. THE AREA DOWN SLOPE FROM THE DEWATERING SITE MUST BE REASONABLY PLANE OR STABILIZED BY VEGETATION OR OTHER MEANS TO ALLOW THE FILTERED WATER TO CONTINUE AS SHEET FLOW.
3. TO ATTACH THE DISCHARGE HOSE, CUT A CORNER OF THE BAG, INSERT DISCHARGE HOSE, AND SECURE THE HOSE TO THE BAG.
4. A SINGLE FILTER BAG SHOULD NOT BE USED FOR FLOWS GREATER THAN 600 GALLONS PER MINUTE.
5. REPLACE FILTER BAG BEFORE IT IS COMPLETELY FILLED WITH SEDIMENT. MONITOR DISCHARGE TO AVOID OVER PRESSURING DUE TO PLUGGING, WHICH MAY RESULT IN RUPTURE.
6. DISPOSE OF USED FILTER BAG AND SEDIMENT AT A SITE APPROVED BY THE COMPANY.

DONLIN GOLD PROJECT

APPLICANT: Donlin Gold, LLC.
4720 Business Park Blvd., Suite G–25
Anchorage, Alaska 99503

TYPICAL
GEOTEXTILE FILTER BAGS FOR DEWATERING

OWNER:

DATE: OCTOBER 2013	P01W–TYEC–03	REV 1

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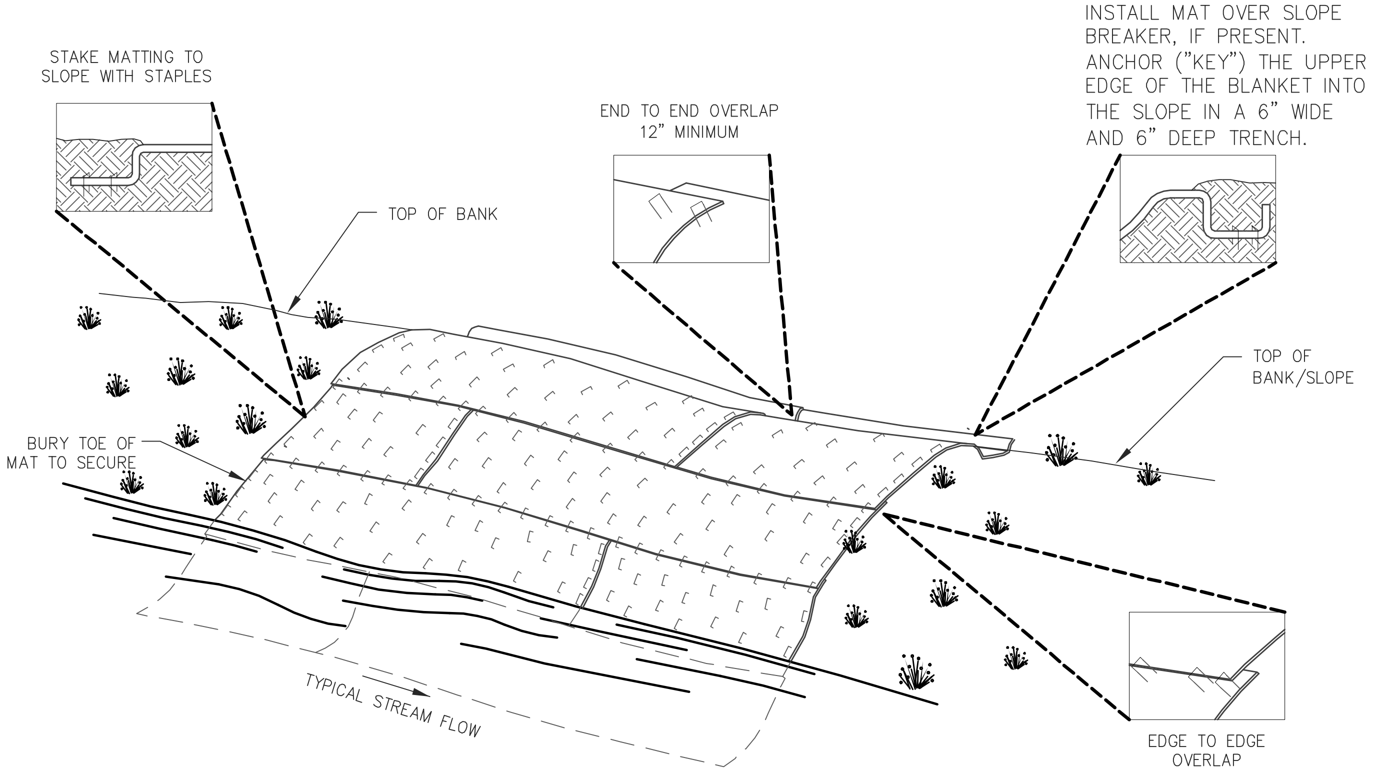


NOTE:

1. EROSION CONTROL MATTING (BLANKETS) COULD BE USED AT THE BANKS OF ALL WATERBODIES AND ON STEEP SLOPES.
2. THE EROSION CONTROL MATTING SHALL MAKE UNIFORM CONTACT WITH THE SOIL UNDERNEATH WITH NO BRIDGING OF RILLS OR GULLIE. JOINING MATS SHOULD OVERLAP.
3. MONITOR FOR WASHOUTS, STAPLE INTEGRITY OR MAT MOVEMENT PRIOR TO COMPLETION OF CONSTRUCTION. REPLACE OR REPAIR AS NECESSARY.

DONLIN GOLD PROJECT

APPLICANT: Donlin Gold, LLC.

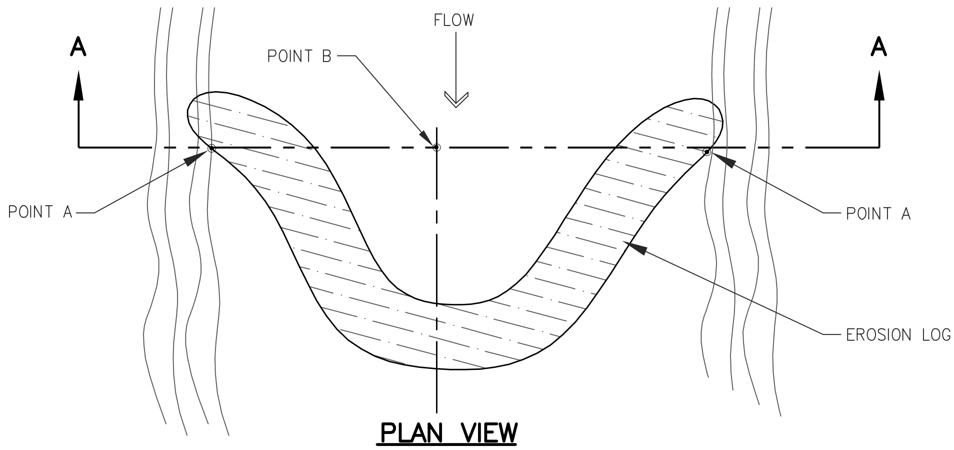
4720 Business Park Blvd., Suite G-25
Anchorage, Alaska 99503

TYPICAL
EROSION CONTROL MATTING STREAMBANKS

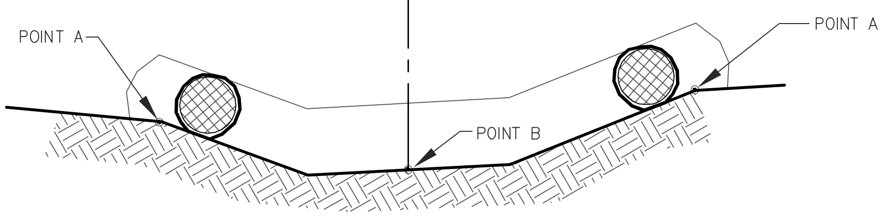
OWNER:

DATE: OCTOBER 2013	P01W-TYEC-06	REV 1

MBaker P01W-TYEC-06 Wed, 16/Oct/13

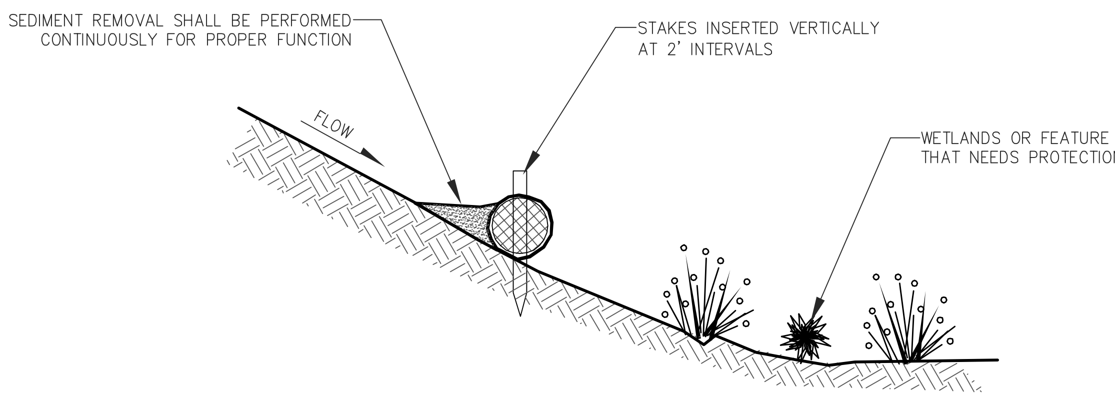


PLAN VIEW



POINTS A MUST BE HIGHER THAN POINT B

SECTION A–A



TYPICAL STAKING PATTERN

NOT TO SCALE

DONLIN GOLD PROJECT

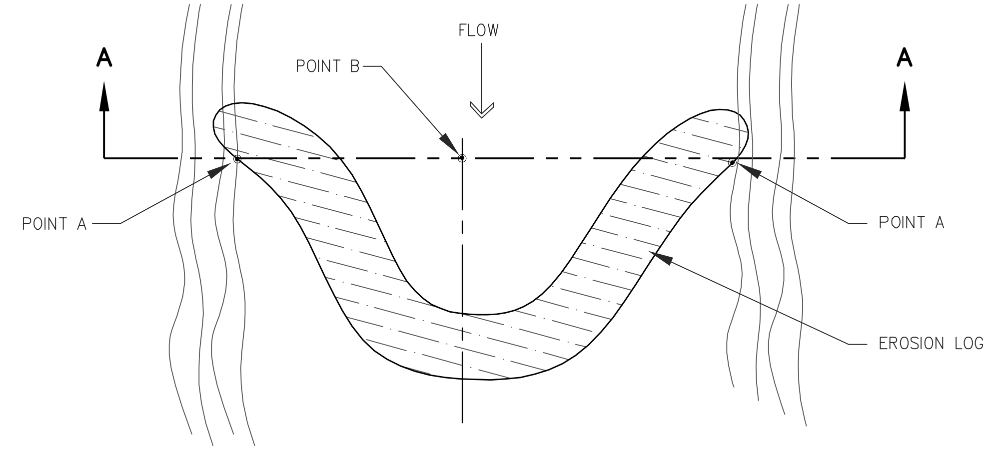
APPLICANT: Donlin Gold, LLC.
4720 Business Park Blvd., Suite G–25
Anchorage, Alaska 99503

TYPICAL
WATTLE BMP

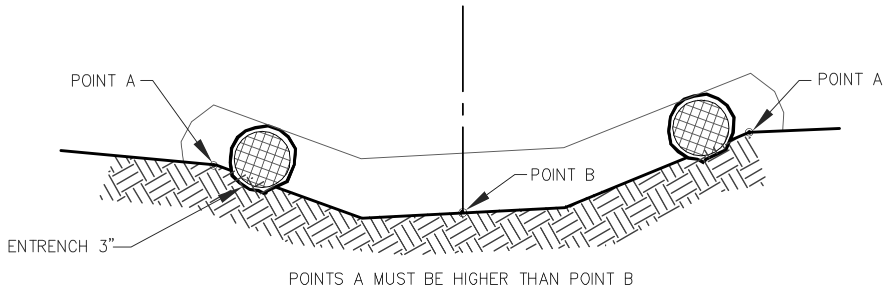
OWNER:

DATE: OCTOBER 2013	P01W–TYEC–07	REV 1

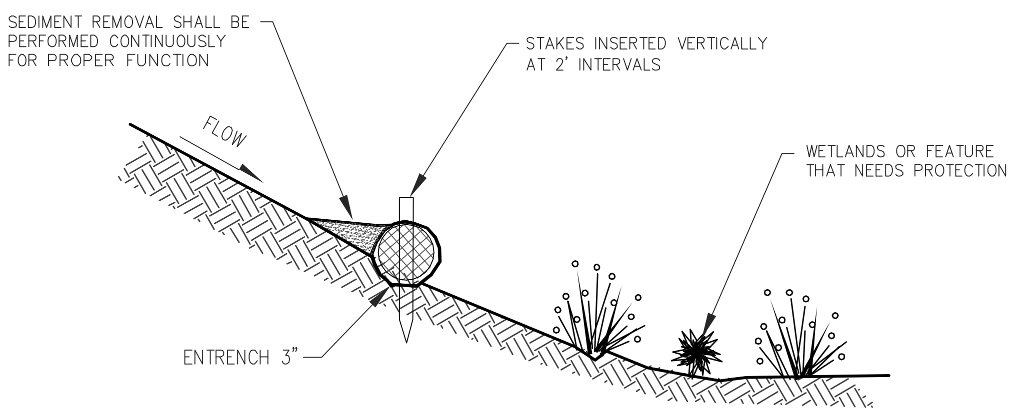
MBaker P01W–TYEC–07 Wed, 16/Oct/13



PLAN VIEW



SECTION A–A



TYPICAL STAKING PATTERN

NOT TO SCALE

DONLIN GOLD PROJECT

APPLICANT: Donlin Gold, LLC.

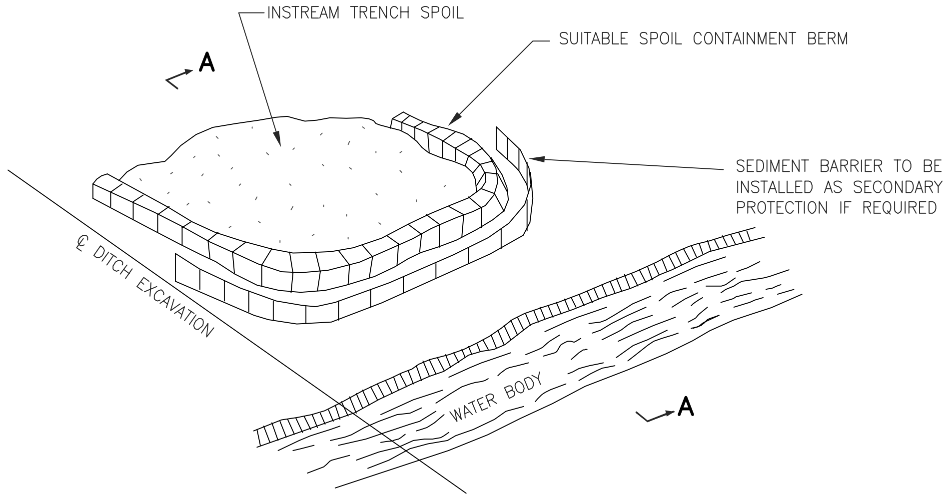
4720 Business Park Blvd., Suite G–25
Anchorage, Alaska 99503

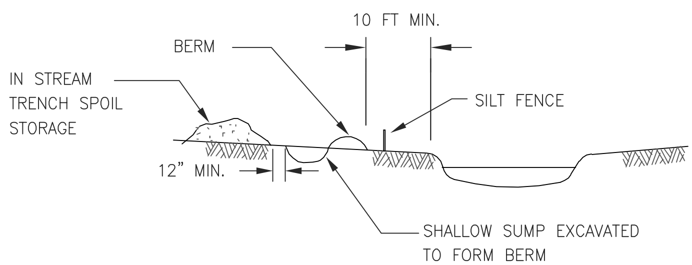
TYPICAL
WATTLE BMP ENTRENCHED

OWNER:

DATE: OCTOBER 2013	P01W–TYEC–08	REV 1

MBaker P01W–TYEC–08 Wed, 16/Oct/13





SECTION A–A

NOTES:

1. SOIL CONTAINMENT BERMS ARE TO BE USED WHERE INSTREAM TRENCH SPOIL COULD REENTER THE WATERBODY DIRECTLY OR INDIRECTLY AND WITH SIMULTANEOUS UTILIZATION OF SEDIMENT BARRIERS IF REQUIRED.
2. MATERIAL USED FOR THE CONTAINMENT BERM SHOULD BE KEPT TO A HEIGHT WHICH REMAINS STABLE DURING THE CONSTRUCTION PERIOD.
3. CARE SHOULD BE TAKEN THAT THE SPOIL PILE DOES NOT OVERTOP THE CONTAINMENT BERM.
4. THE CONTAINMENT BERM SHOULD BE DISMANTLED AND THE SITE RESTORED TO THE ORIGINAL CONDITION UPON COMPLETION OF THE WATER CROSSING.
5. CARE AND ATTENTION MUST BE TAKEN TO ENSURE SPOIL CONTAINMENT BERMS ARE MAINTAINED.
6. FULL CONSIDERATION FOR OVERALL SLOPE STABILITY IS REQUIRED WHEN SELECTING A SPOIL CONTAINMENT LOCATION.

DONLIN GOLD PROJECT

APPLICANT: Donlin Gold, LLC.
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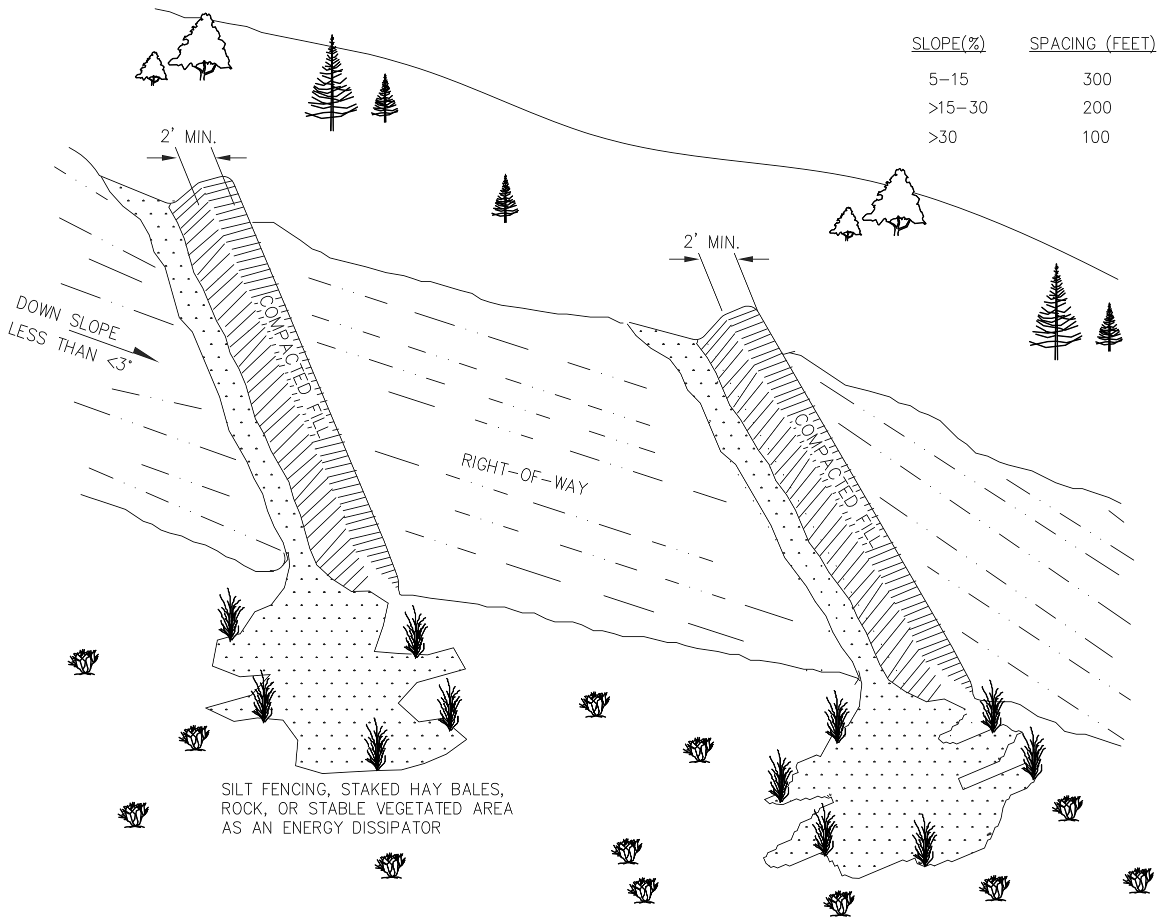
TYPICAL
TEMPORARY SOIL CONTAINMENT BERM

OWNER:

DATE: OCTOBER 2013 | P01W–TYEC–09 | REV 1

MBaker P01W–TYEC–09 Wed, 16/Oct/13

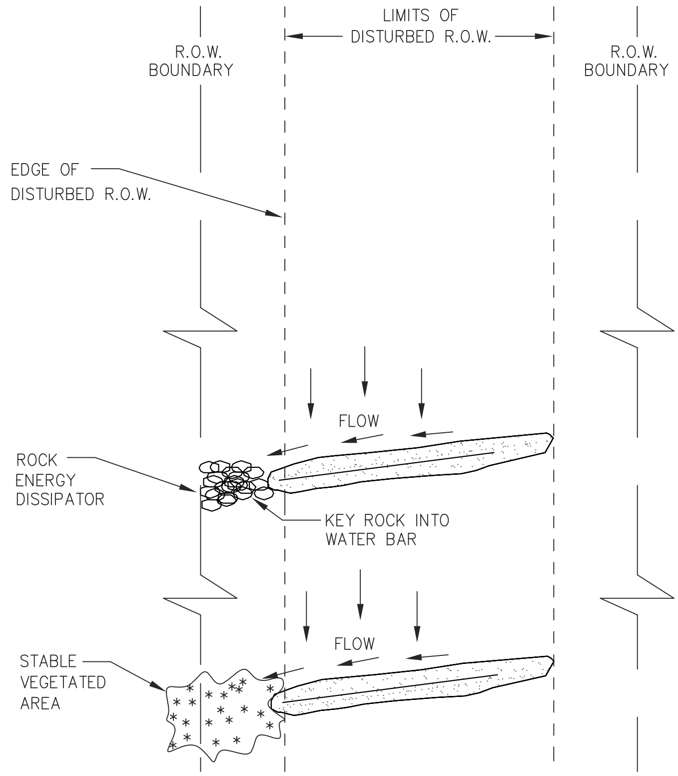


SLOPE BREAKER NOTES:

1. SLOPE BREAKERS SHALL BE CONSTRUCTED OF NATIVE SOIL AND INSTALLED AT LOCATIONS AS SHOWN ON THE CONSTRUCTION DRAWINGS, OR AS REQUIRED.
2. SLOPE BREAKER SHALL BE ORIENTED AS SHOWN OR OTHER PATTERN AS REQUIRED.
3. SLOPE BREAKERS SHALL BE CONSTRUCTED AT A 2–8% GRADIENT ACROSS THE SLOPE.
4. THE SLOPE BREAKERS SHALL BE 18" DEEP (AS MEASURED FROM THE TROUGH TO THE TOP OF THE SLOPE BREAKER). THE TROUGH WILL BE A MINIMUM OF 5' WIDE ACROSS THE WIDTH OF THE RIGHT-OF-WAY.
5. THE OUTLET OF THE SLOPE BREAKER MUST FREELY DISCHARGE ALL RUNOFF OFF THE DISTURBED R.O.W. INTO A STABLE, WELL VEGETATED AREA OR INTO AN ENERGY DISSIPATOR.
6. WHERE SLOPE BREAKERS EXTEND BEYOND THE EDGE OF THE CONSTRUCTION R.O.W. TO DIRECT RUNOFF INTO STABLE, WELL VEGETATED AREAS, THESE LOCATIONS MUST BE APPROVED.

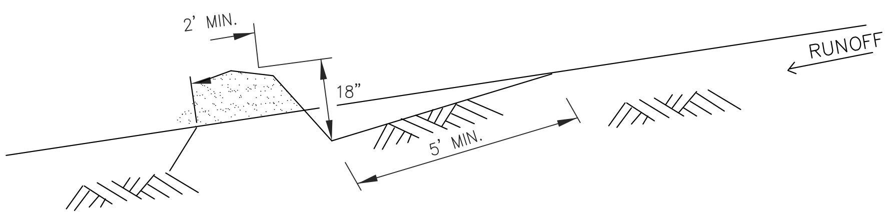
DONLIN GOLD PROJECT APPLICANT: Donlin Gold, LLC. 4720 Business Park Blvd., Suite G-25 Anchorage, Alaska 99503	
TYPICAL SLOPE BREAKER WITH LONGITUDINAL CROSS SLOPES (SHT. 1 OF 3)	
OWNER:	
DATE: OCTOBER 2013	P01W-TYEC-10 — REV 1

MBaker P01W-TYEC-10 Wed, 23/Oct/13



SLOPE(%)	SPACING (FEET)
5–15	300
>15–30	200
>30	100

PLAN VIEW



SLOPE BREAKER CROSS SECTION DETAIL

FLOW ENERGY DISSIPATOR NOTES:

1. THE OUTLET SHALL CONTAIN AN ENERGY DISSIPATOR IF THE COMPANY DETERMINES EXISTING VEGETATION IS NOT SUFFICIENTLY STABLE TO PREVENT EROSION. THE ENERGY DISSIPATOR SHALL BE CONSTRUCTED AS FOLLOWS:

- OUTFALL END OF DISSIPATOR SHOULD BE LOWER THAN SLOPE BREAKER END.
- SILT FENCE, STRAW BALE OR ROCK DISSIPATORS SHOULD BE KEYED INTO THE END OF THE SLOPE BREAKER.
- PROVIDE ENOUGH AREA INSIDE "L" TO CAPTURE AND HOLD SEDIMENT.

DONLIN GOLD PROJECT

APPLICANT: Donlin Gold, LLC.
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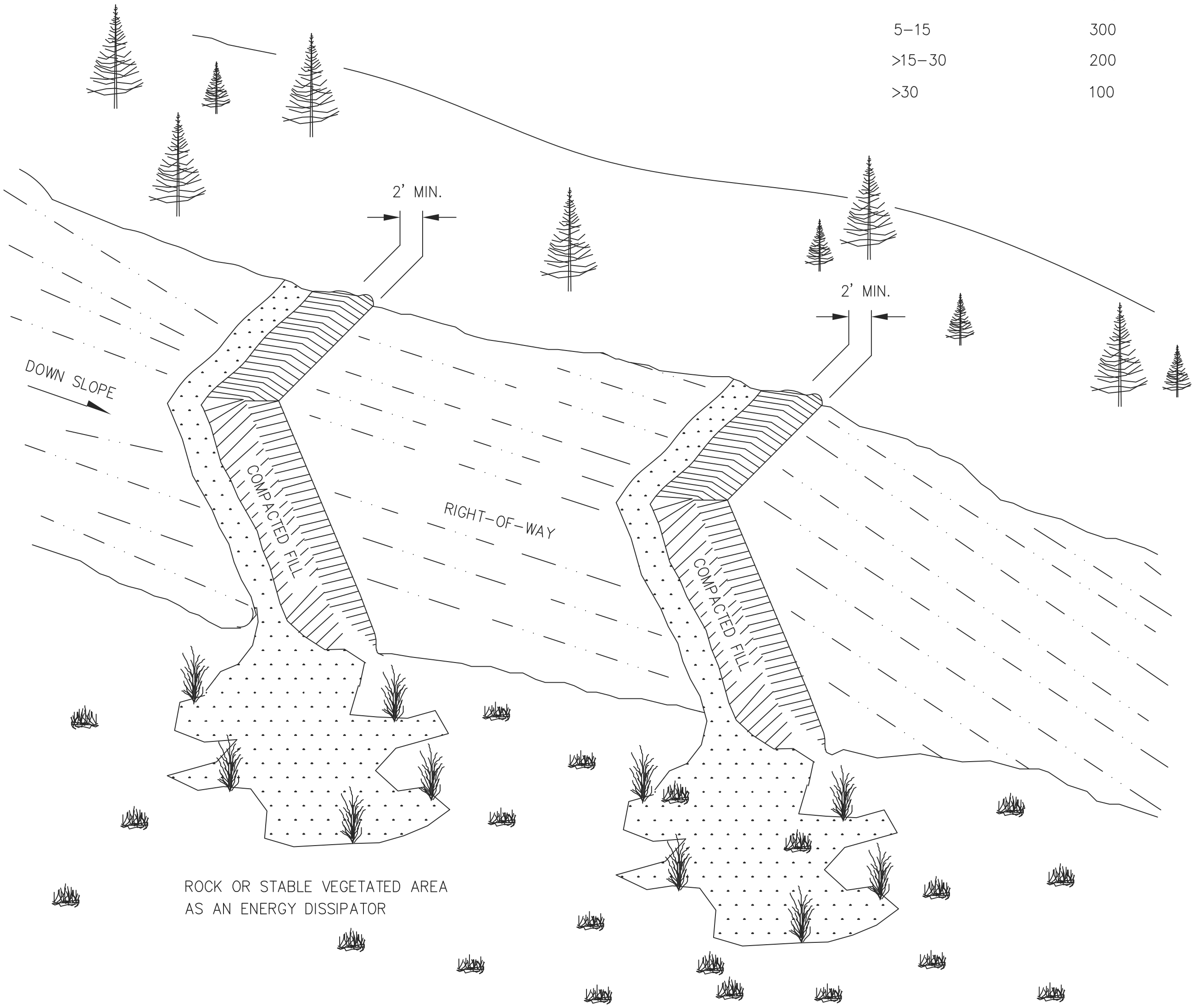
TYPICAL SLOPE BREAKER WITH LONGITUDINAL CROSS SLOPES (SHT. 2 OF 3)

OWNER:

DATE: OCTOBER 2013 | P01W–TYEC–11 | REV 1

MBaker P01W–TYEC–11 Wed, 23/Oct/13

SLOPE(%)	SPACING (FEET)
5–15	300
>15–30	200
>30	100



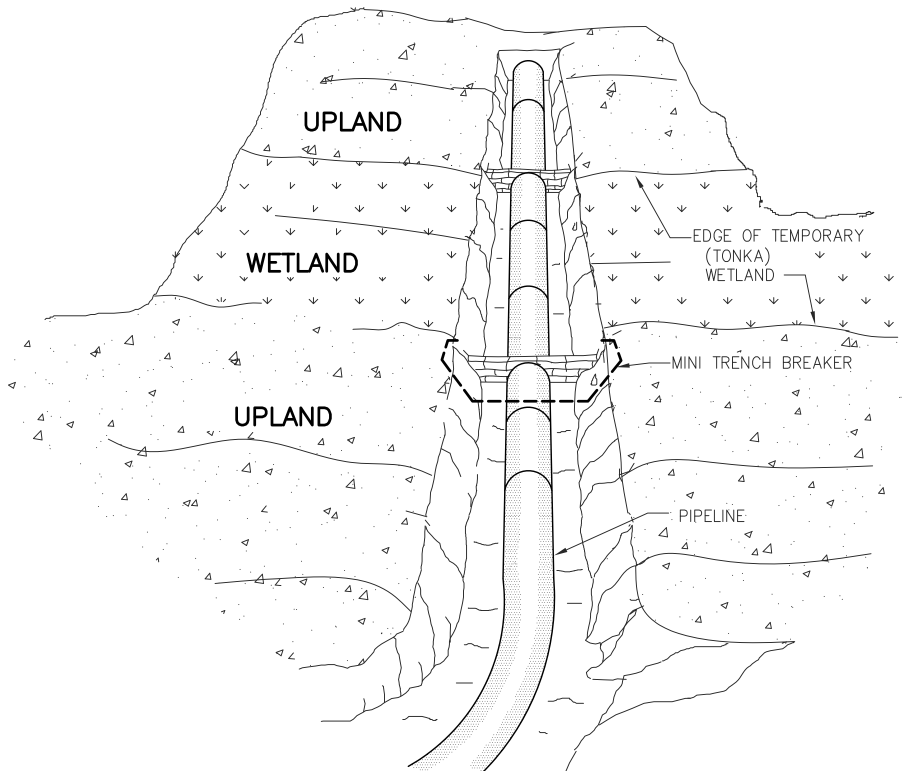
DONLIN GOLD PROJECT
APPLICANT: Donlin Gold, LLC.
4720 Business Park Blvd., Suite G–25
Anchorage, Alaska 99503

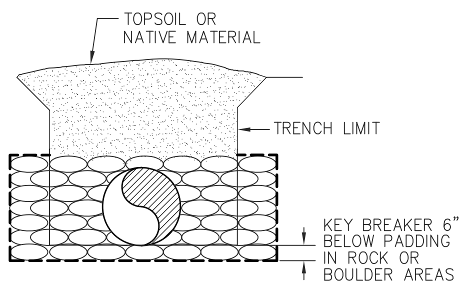
TYPICAL SLOPE BREAKER WITH LONGITUDINAL CROSS SLOPES (SHT. 3 OF 3)

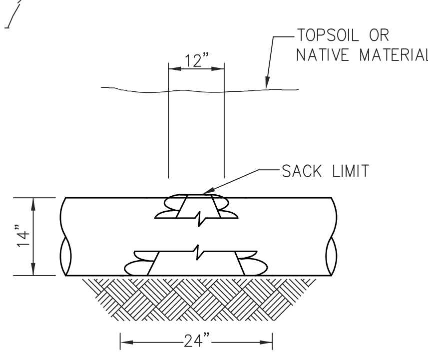
OWNER:

DATE: OCTOBER 2013 | P01W–TYEC–12 | REV 1

MBaker P01W–TYEC–12 Wed, 23/Oct/13







CROSS SECTION

SIDE VIEW

NOTES:

1. MINI-TRENCH BREAKERS SHALL BE INSTALLED AT EDGE OF EACH TEMPORARY (TONKA) WETLAND.
2. OPEN WEAVE HEMP OR JUTE SACKS SHALL BE FILLED WITH A MINIMUM OF 55lbs. OF SAND OR SUBSOIL.
3. BREAKER CONFIGURATION MAY BE CHANGED TO INCLUDE KEYING AS DETERMINED BY COMPANY ENGINEER.

DONLIN GOLD PROJECT

APPLICANT: Donlin Gold, LLC.

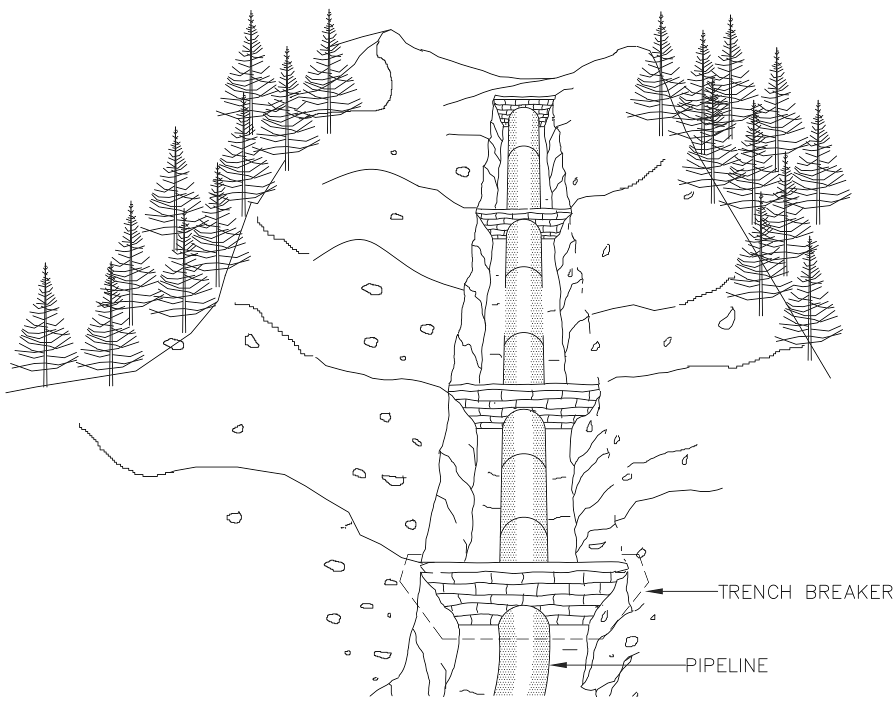
4720 Business Park Blvd., Suite G-25
Anchorage, Alaska 99503

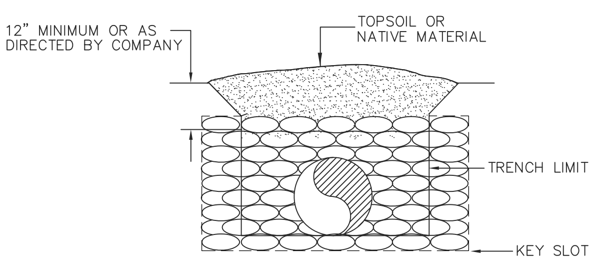
TYPICAL MINI-TRENCH BREAKER

OWNER:

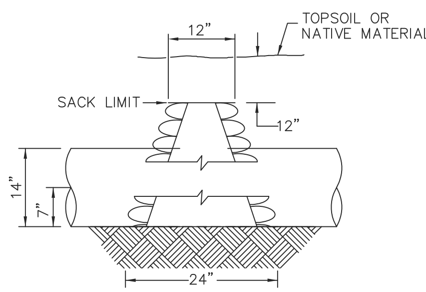
DATE: OCTOBER 2013	P01W-TYTR-01	REV 1

MBaker P01W-TYTR-01 Wed, 16/Oct/13





CROSS SECTION



SIDE VIEW

NOTES:

1. TRENCH BREAKERS SHALL BE INSTALLED:
   - ON SLOPES ALONG THE TRENCH LINE WHERE THE NATURAL DRAINAGE PATTERN, PROFILE, AND TYPE OF BACKFILL MATERIAL MAY RESULT IN LOSS OF BACKFILL MATERIAL OR ALTERATION OF THE NATURAL PATTERN
   - AT THE BASE OF SLOPES ADJACENT TO WATERBODIES AND WETLANDS
   - WHERE NEEDED TO AVOID DRAINING A WETLAND

2. OPEN WEAVE HEMP OR JUTE SACKS SHALL BE FILLED WITH A MINIMUM OF 55lbs IN A MIXTURE OF SAND & SUBSOIL.

3. BREAKER SPACING AND CONFIGURATION, INCLUDING THE NEED TO KEY THE BREAKER INTO THE UNDISTURBED SOIL AT THE SIDES AND BOTTOM OF THE TRENCH, MAY CHANGE AS DETERMINED BY COMPANY ENGINEER.

DONLIN GOLD PROJECT

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Anchorage, Alaska 99503

TYPICAL
TRENCH BREAKER REQUIREMENTS

OWNER:

DATE: OCTOBER 2013	P01W-TYTR-02	REV 1

MBaker P01W-TYTR-02 Wed, 16/Oct/13